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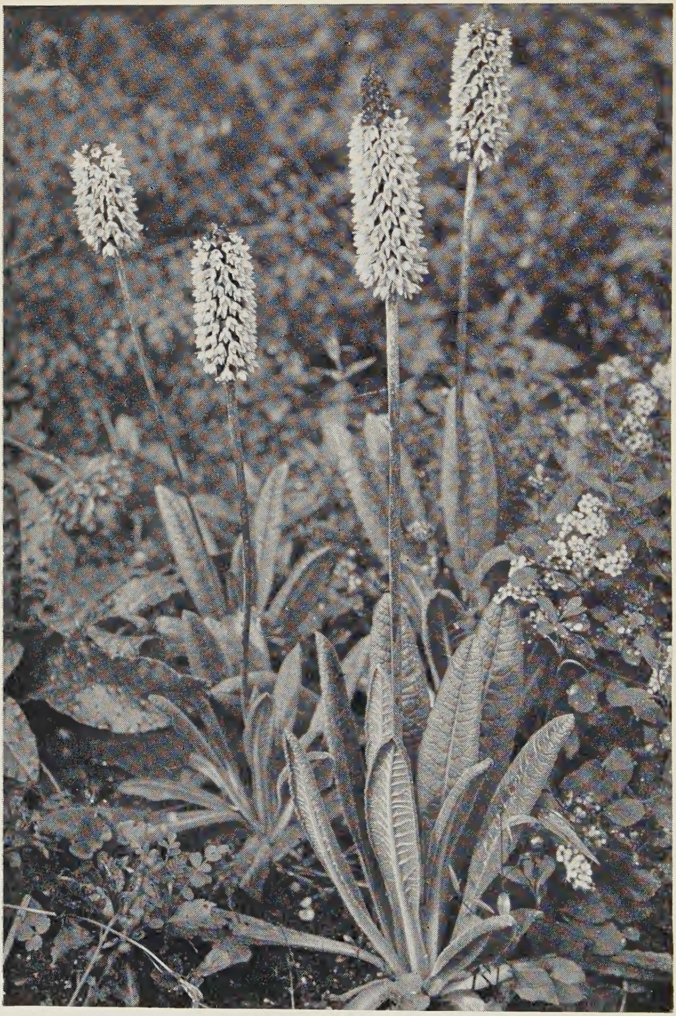
PRIMULAS

FOR GARDEN AND GREENHOUSE



PRIMULA LITTONIANA (MUSCARIOIDES SECTION)

Is one of the finest of all species.

PRIMULAS

FOR GARDEN AND GREENHOUSE

BY

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AND

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PREFACE

A WORD of explanation may be necessary to indicate to the beginner the division of Primula species into sections. Although these sections are to a certain extent arbitrary, yet all species grouped in a certain section show some common physical characteristics. This is of more importance to the botanist, but the cultivator will find that most of the species in each section prefer more or less the same treatment and situation, and thus the division of Primula species into various sections is of value to the gardener as well as to the specialist. If he obtains a new species, its cultivation will be simplified if the section into which it falls is known.

Our thanks are due to many friends who have assisted us in writing this volume, particularly to Miss Gertrude Jekyll for a description of the origin of the Munstead strain of Polyanthus, to Professor W. W. Smith and Mr. William Low for reading various chapters in manuscript, and to Mr. R. L. Harrow, Mr. C. T. Musgrave, and Mr. E. A. Bowles in connection with the table of the times of flowering.

E. H. M. C.
G. C. T.

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PRIMULAS

FOR THE GARDEN AND GREENHOUSE

CHAPTER I

INTRODUCTION

THE object of this volume is to try to teach the amateur gardener a little about the fascinating genus Primula. He probably grows Primroses and Polyanthus, and realises the value of indoor varieties of Primula as decorative plants; he may cultivate one or two species, but of the genus as a whole he is vaguely alarmed, and considers them to be only plants for the specialist. We are trying, therefore, within a small compass, to dissipate this feeling of the plant for the specialist, and to prove that they are plants suitable for the average garden.

Let us leave alone for a moment ordinary Primroses and Polyanthus, the greenhouse varieties, and species from the European Alps, which almost without exception are plants for the rock garden, and consider the extra-European species which form the great proportion of Primulas in cultivation. The genus Primula is extremely widespread throughout the northern hemisphere, with an odd species straggling southwards, even as far as the Magellan Strait. With the increase in plant introduction that began towards the middle of the nineteenth century, it was obviously only a question of time before collectors began to send home seed of what they considered to be the best species for cultivation in our gardens. A few species were introduced into general cultivation before the end of the century, but the main invasion began shortly after 1900, with the opening of the virgin field of botanical exploration in China and its borders, an invasion that has been increasing in numbers and importance ever since. In a way this influx of new Primulas may be likened to that of Rhododendrons, another genus where the bulk of the new species have been collected in China. In the same way gardeners have been slightly alarmed at the very large numbers of the introductions, and have hesitated to grow them until they have been thoroughly tested; in the same way experiments have had to be made owing to differences in climate to find out what conditions suit them best. But there the similarity ceases. A Rhododendron may take anything from three to thirty years to flower, whereas all Primulas, with an extremely rare exception, will flower in two years from seed.

Plants from China are so important nowadays in our gardens that it may be asked why some of the best of the newer Primulas are not in more general cultivation. There are several reasons for this slow rate of assimilation. The stereotyped answers will be that the average gardener is conservative, and that the nurserymen are slow to realise the importance of new plants; but the real answer is not so obvious, and it applies equally to the slow rate of introduction into general cultivation of Rhododendrons and Meconopsis, two other genera of which China has supplied the bulk of our new plants.

The truth is that most plants in China inhabit areas which are limited by local conditions of soil and climate. The number of different species of Primula and Meconopsis and Rhododendron that exist is largely due to this extreme variation. You may find two closely allied species at different altitudes, or in neighbouring areas, separated by intermediate forms, but the one will not encroach on the territory of the other. Herein lies the difference between plants from the wilds and plants that have been grown in gardens for many generations. The garden plant from long cultivation is able to grow under conditions that may be widely apart. Let us take the Delphinium as an example. It will flourish in chalk or clay or sand; it has no objection to moderate drought or a moderate soaking; it will grow as well in the north-east of Scotland as in the south-west of England. Not so the plant from the wilds that has been accustomed to grow under certain definite conditions. It is unfair to expect it to accept at once the hundred and one situations of the average garden. The gardener should make every effort to try to copy the situation and moisture and shade to which the plant is accustomed. This is not always easy, and is the reason why so many fine Primulas have failed to respond to cultivation, for they grow under conditions which we are unable to reproduce in our gardens. This might act as a deterrent if it were not for the fact that many magnificent species are not proving so particular, and are much more adaptable.

One is accustomed to lay failure with a particular plant to lack of hardiness, but with most plants from the Far East this is not the case. Difficult they may be, but this is caused by the sudden change from a climate where seasons are well defined to our curious mixture in these islands, where our spring comes in the middle of winter and our summer may never appear at all.

These narrow limits have necessitated a large amount of experimenting so as to find out the best methods of cultivation, and in this respect all praise must be given to the Royal Botanic Garden at Edinburgh. The late Sir Isaac Bailey Balfour and his successor, Professor W. W. Smith, by their infinite research and enthusiasm, have done much to popularise the genus, while to Mr. R. L. Harrow, the curator, and Mr. L. B. Stewart, the assistant curator, gardeners owe a great debt of gratitude for teaching them much of what they know about cultivation and propagation. But even with all their research there is still much to learn. There is never a last word written or said about any garden plant, and this is particularly true of the Primula. There are dozens of ways in which the amateur can do a little experimenting for himself. For instance, comparatively little is known of the response Primulas make in various limy soils; the question of the hybridisation and the fixation of species is still in its infancy; above all, there is still the coaxing of many difficult species to be undertaken. It is possible that, with the present knowledge, some of the earlier introductions that have, alas! disappeared from ken would now be grown successfully. The amateur has plenty to do in finding out what soils and degrees of heat and moisture suit Primulas in various parts of the country.

Finally, the beginner in Primulas may become exasperated at the constant reiteration in the following chapters of the words *drainage*, *sunshine*, *moisture*, *shade*. They form the crux of the successful cultivation of the genus, and the constant reference to them has been deliberate. Gardeners are sometimes too much inclined to tar all plants with the same brush. If one plant proves amenable under certain conditions, it is by no means certain that even close relatives will respond in a similar situation. Primulas must be treated as individual plants within certain limits.

CHAPTER II

PROPAGATION

ALTHOUGH the beginner in gardening may be tempted, by reason of the limited space at his disposal, to stock his garden with Primulas that are already reaching maturity, this procedure is unwise. Besides being an extravagant method of gardening, it is one which teaches nothing. The habits of the plants that one is growing are not discovered; and their likes and dislikes cannot be catered for in the same way as if the plants had been tended through all the various stages of their life, from the seed stage to maturity; moreover, the fascination of watching a plant's growth is lost. Propagation and cultivation go hand in hand; a knowledge of the former leads to success with the latter. It is especially true of Primulas, as their cultural needs may readily be recognised through the experience gained in their propagation.

The propagation of Primulas may be effected in three ways:

A. By seeds.
B. By division.
C. By offsets.

Of these, the more common methods are by seed and division.

A. PRIMULAS FROM SEED.

In the raising of Primulas from seed no elaborate preparations are necessary, and the work can be carried

STURDY CANDELABRA PRIMULAS IN FRUIT

These plants are growing in full sun with ample moisture at their base. They will be ready for division next year.

out quite conveniently in a small space. There are two methods of sowing:

(1) Indoors in pots or pans.
(2) Hardy Primulas in a bed outside or in a cold frame.

Although the former is an older system, formerly considered necessary for all species whether hardy or otherwise, it has now partly become superseded by outdoor treatment for hardy Primulas when grown from seed in bulk. The Candelabra and Sikkimensis sections are examples. Indoor propagation, however, is a necessary procedure in many instances. A supply of good, porous pots or pans must be available, and a suitable compost for raising seedlings. This is best prepared by mixing two parts of good, fibrous loam, two parts of leaf-soil, and one part of sand, and passing the mixture through a sieve to secure a fine consistency. The compost should be neither too stiff nor too soft, and a good way to test it is to pick up a handful and squeeze it. If the ball breaks up easily, it is right for use; on the other hand, if it retains its shape, it is too stiff for the purpose of raising seedlings. The next important point is the question of drainage, and with Primulas especially it is one which must be attended to with care. Good drainage is a necessity, and should consist of broken crocks of various sizes. The pots should be filled about one-third or half-full with crocks, depending on the size of the pots. One large crock must be placed over the drainage hole; then on top place some Sphagnum Moss, Beech leaves, or some similar material to prevent the upper soil from being washed down into the drainage. The pot may then be filled to within one inch of the rim, placing the rough soil next the layer of mossy fibre, gradually becoming finer towards the top, and finishing off with a very fine surface. The whole compost should be made fairly firm while still retaining its porosity.

In sowing seed there are two mistakes which every beginner is liable to make: one is to sow too deeply, and the other to sow too thickly. Many failures in the raising of seedlings can be directly traced to these two errors. Some authorities advise sowing on the surface of the soil, leaving the seeds uncovered; but such a course should not be followed. It is better just to cover the seeds with a very fine sprinkling of sand or soil through which the seeds may be seen shining. This layer, fine though it is, serves to keep the seeds in position, and seems to promote better germination. The more thinly the seeds are sown the better; not only is this a more economical practice, but still more important, it means healthier and more robust seedlings. The seedlings in a thickly sown pot are drawn up towards the light, with the result that they are spindly and weak in growth. Overcrowding tends to damping off owing to the surface soil becoming stagnant from lack of air. In sowing Primulas the ideal to aim at is to sow just sufficient seed in a pot or pan that the resultant seedlings can be grown on and planted out direct in their flowering positions without the intermediate stage of pricking off the seedlings. The less the seedlings are disturbed the better will be the plants, and the less will be the risk of loss among the seedlings. This is a plan that has not received much consideration from growers in the past, and it is not always feasible owing to considerations of space, but it is one well worth trying.

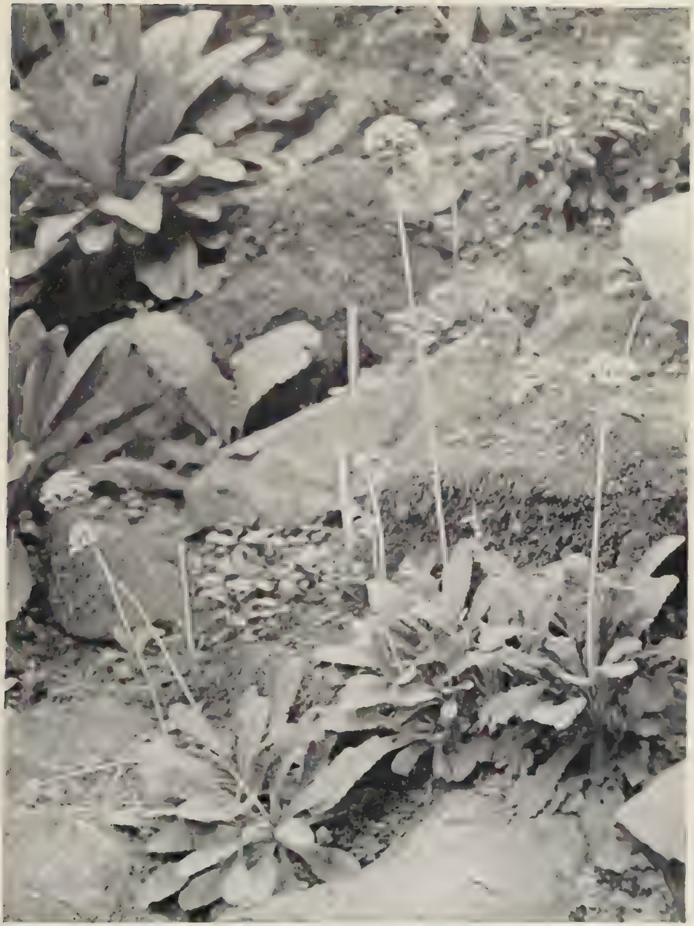
The next point to be observed in seedling raising is watering. It is sometimes advised to water the soil before sowing, but on the whole it is better to water after sowing. This may be done either by immersing the pot or pan in a basin of water up to the rim and holding it there until percolation has taken place, or watering from the top through a very fine rose. In the former case a more even distribution of moisture is obtained in the seed pan, while there is also less likelihood of displacing the seeds than by following the latter method. When many seedlings are being raised, however, watering with a fine rose will be found more convenient and saves much time.

After sowing, cover the pots with a pane of glass and a strip of brown paper and place in a frame or greenhouse. Look over the seed pan at regular intervals and see that the soil does not become too dry. The glass can be taken off and wiped clean with a rag every two or three days to remove any moisture that may have collected.

PRIMULAS IN FRAMES AND OUTSIDE BEDS.—Where large numbers of plants of the hardiest species or varieties are required and ground space is limited, then outdoor sowing in a cold frame or bed should be adopted. In this case the procedure is the same as for indoor sowing: ample drainage, a layer of ashes, etc., of some 6 to 9 inches, should be laid at the bottom of the bed or frame, with on top a 6-inch layer of mossy fibre. Then a compost of loam, leaf-soil, and sand should be added on top to a depth of 5 or 6 inches, making the surface fairly firm. Again, sow the seed thinly and evenly either in drills or broadcast. Cover very lightly, and water with a rose fine enough to prevent washing away the seeds. Then close the frame until germination occurs. Always see that there is plenty of moisture present, as most representatives of the genus like plenty of water, some more than others, as, for example, the Candelabra and Sikkimensis sections, which include such well-known species as *P. Bulleyana, Cockburniana, helodoxa, pulverulenta, sikkimensis*, and *Florindæ*. All these species respond particularly well to the outdoor method of treatment.

Primula seeds may be sown in autumn or in spring, but the best time for indoor sowing is undoubtedly a few weeks after ripening at the end of the summer. The plants should be gone over very carefully when the flowers have dropped and the capsules collected as soon as they show signs of opening. Do not delay for any length of time, otherwise the seeds are dropped from the capsules and will be lost. Before sowing lay them on a sheet of paper to ripen off, being careful to label each kind and to keep them separate. Autumn sowing gives a larger percentage of germination than spring sowing, but in some cases a number of the seeds remain dormant the first year and appear the second spring after sowing. Primulas are peculiar in this respect, and if germination is poor the first year the seed pan should never be thrown away until at least after the second year. The best time to sow in a cold frame is March, or a month later in a bed. The latter should be prepared in the same way as a frame, and it must be shaded.

TREATMENT OF SEEDLINGS.—Once the seedlings appear they should be given all the light and air possible. The transition to these conditions should not be brought about too rapidly, however, as the young seedlings may



PRIMULA CRISPATA (CAPITATA SECTION)

In flower in late summer. These plants are ready for division as soon as the flowers are over.

suffer check. Never expose the plants to hot sunshine, otherwise they wilt quickly and die off. Water at regular intervals, and keep a look-out for the appearance of the damping-off disease, which is due to a concentration of moisture on the surface of the soil and lack of air circulation. Once the seedlings are well into growth, and they have made their second pair of true leaves, they are ready for pricking out either into boxes or pans. The soil in these receptacles should be the same as the seed compost, and the operation should be carried out with as little disturbance to the seedlings and the seed pans as possible. Primulas other than indoor varieties should be placed in a cold frame as soon as possible; they do not like greenhouse conditions, particularly in summer.

Among the many Primula species there are a number which, by reason of their behaviour in our gardens, have raised some interesting problems, which, although they hardly come within the scope of this volume, must be mentioned, as they have a bearing on the raising of these special types from seed. It would appear that of all those kinds which set seed under garden conditions, a number are to be regarded as true species as they breed true to type—*i.e.*, the seed produces a plant similar in all respects to the parent, while others of those accorded specific rank are by no means to be considered as true species with fixed and hereditary characters. Under conditions at home they show all manner of variation both in habit and particularly in flower colour, if they are grown from seed. While this may partly be due to the unstable character of the particular species, as it may be one in a state of flux with its characters not fixed, it is also true that such variation can be traced to the readiness of many species to cross with others of the same section growing in close proximity. Primulas belonging to some sections, such as the Auricula and the Candelabra, seem to have this ability of crossing readily, while others have not. It is a point upon which further investigation is required, but it seems highly probable that certain of these species are natural hybrids in the process of fixation, and the fixation point has not been reached—*i.e.*, they have not attained the specific quality of breeding true.

P. Bulleyana and *P. Beesiana* are two outstanding examples of species which cross easily, and if grown together it is highly probable that the original type plants will tend to disappear in the welter of natural hybrids which spring up in succeeding generations.

We have three arbitrary divisions which seem to merge into one another. On the one hand we have (*a*) those Primulas that seed freely and which remain true to type, do not readily cross, and do not require segregating—*i.e.*, one may be certain that by collecting seed in the garden of such a species and sowing it, a plant similar in all respects to the parent will be obtained. The best example of this group is *P. helodoxa*. On the other hand, we have (*b*) those Primulas which seed freely, but which cross readily with others of a similar nature growing in close proximity—*e.g.*, *P. Bulleyana* and *P. Beesiana.* The third group might be defined as those Primulas which seed freely and which do not cross so readily, but which do not come true to type—*i.e.*, they are definitely species in a state of flux, and under garden conditions require selecting if the best is to be obtained from the plant. Examples of this group are *P. japonica* and *P. pulverulenta.* Added to this complexity in the behaviour of these species we have now to contend with many garden hybrids and forms which have made their appearance during the last few years. It has been pointed out by many lovers of the genus that some attention must be given to this indiscriminate crossing and naming, as this continued practice makes more confusion. Amateurs should bear in mind when working with hybrids that the seedlings will not come true, and where they have a particular plant such as *P. Red Hugh* (a hybrid between *P. Cockburniana* and *P. pulverulenta*), which it is desired to increase, division of the crown must be resorted to, if a plant exactly the same as the parent is aimed at. All seedlings of Red Hugh will not come true to type. If crosses are to be made, then let that particular cross be known as a strain, and its parentage given. If no seedlings appear worthy of selection, then continue to increase the original form by division to keep it true, and give it a name to follow that of the strain, as has been done in the case of those forms raised at Lissadell. These are known as *P. Lissadell* strain, and the one special seedling form is *P. Lissadell Red Hugh.*

This discussion may seem unnecessary with regard to propagation, but it has a certain bearing on the raising of these plants from seed. It seems almost certain that once any of these forms become widespread in cultivation, some control will be necessary to keep a check on the progeny which will be of a most miscellaneous character, and which might result in the disappearance of certain types from our gardens, as they cannot be relied upon to come true to colour from seed. This may seem unimportant, but nowadays, with the introduction of colour scheming in all gardens, it is necessary that a plant of certain colour, which is purchased with a view to placing in a particular situation from the point of view of colour grouping, should be of the desired shade.

This is where keen amateurs might co-operate with our trade growers in an attempt to raise some of these species which show considerable variation. *Primula japonica* requires selection. If grown from seed, many forms with muddy-coloured flowers appear, of no garden value whatever. On the other hand, there are many good forms, which, if selected and grown on, might in time come true from seed. The same is true of *P. pulverulenta*, and we have here a concrete instance of what may be done in this way. Mr. G. H. Dalrymple, the well-known grower, has grown *P. pulverulenta* for a number of years, and has selected carefully each year, with the result that he has given us a most desirable pink strain of this species. This particular strain was grown on under the strictest supervision, in the attempt to obtain a pure line. The object has been successful, and now the strain if grown from seed will come true to colour. He tells us that this has only taken about eleven years to perform. Such work indicates the elasticity of many of these forms or species, and how in the future we may hope to obtain many desirable garden forms, if selection is carried out on strictly scientific lines. There is only one way that such work can be undertaken, and that is by selecting and growing these species in fairly large blocks, after the fashion of sample plots in forest plantations. The idea is that pure seed will be obtained from the plants growing in the centre of the respective blocks. This is an experiment that might be undertaken on a small scale in many gardens; as well as providing interest and information, it would furnish bright patches of colour in many odd corners in the garden.

B. Propagation by Division.

Method and Time of Division.—Fascinating as seedling raising is, many amateurs will, no doubt, rely on division for increasing their stock of many perennial species. It is the method of increase which is the more common, and generally adopted for many European as well as extra-European species. It is an easy method and one not involving much space. For that reason, therefore, amateurs will find it the one to adopt in a small garden. Division also ensures that a plant is obtained identical in flower colour, size, and habit with the parental type. Naturally it is only possible with plants that form several crowns on the one root system.

Primulas which may be Divided.—All perennial Primulas, including Polyanthus, Cowslips and the common Primrose, which form several crowns or growing points, can be readily increased by division Many Primulas come into this category, and can be so increased, but there are a few which only form the one growing point. Polyanthus, outstanding examples like

P. Bulleyana and *P. pulverulenta*, among the Candelabras, *P. sikkimensis, denticulata, rosea, involucrata, Winteri, marginata*, and others of a similar nature respond readily to division. On the other hand, there are some sections which do not usually form several crowns—as, for example, in the Muscarioides section, represented by *P. Littoniana*. There are two or three species like *P. Forrestii, rufa, suffrutescens* (sub-shrubby), which cannot be divided, as they form crowns attached to a woody main stem.

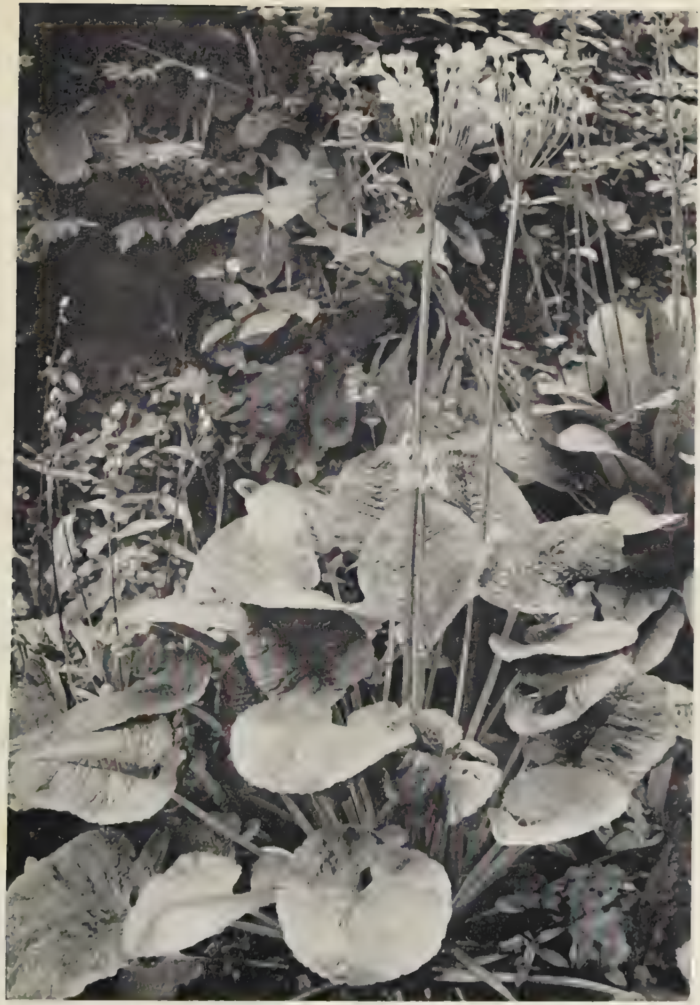
METHOD OF DIVISION.—The method of division is simple. The plants must be lifted carefully with a small fork with a ball of soil, taking care neither to injure the roots nor the foliage. It may be said that when amateurs become proficient at dividing, there is no necessity to lift the old plants. On examination of the old plants it will be seen that there are several crowns, all arising from a central root stock or rhizome. Each of these crowns will have a few roots attached, and it is these crowns which will form the new plants. Each crown may be removed by breaking gently, or preferably cutting it away with a sharp knife from the root stock, keeping the roots attached. Each crown may then be replanted, pressing it firmly into the soil and making this firm round the crown. When replanting be sure to dig a hole sufficiently large for the size of the root which comes away with the crown. After planting give the plant a good soaking of water to wash in the soil about the roots, and to give them every chance of becoming rapidly established. Wilting will probably occur for a week or so, and if the weather be dry give the plant plenty of water every day. With many species it is unlikely that the plants will be growing in a sunny position, but if so they should be shaded if possible by placing spruce or fir branches over them, or a covering of tiffany or some other material. The whole aim of the grower should be to have the young plants firmly established before the arrival of the winter frosts. For this reason also the plants should be firmly established to avoid lifting of the crowns by frost action.

The best time to undertake division is soon after flowering. July and August will be found the best months, and if any showery weather is experienced during that period, carry out the work then. The plants will suffer less check if lifted and replanted when the soil is moist and warm, as they will establish themselves quickly in their new positions, when root action is still active. Most Primulas should be divided at least every two years, but with strong growers or where a rapid increase of stock is found or desired, then it can be done every year, as too many crowns lead to a multitude of small flower spikes. If division cannot be undertaken in July or August, then the next best time is in early spring when root action is beginning. There is little doubt that frequent division makes for better and more robust plants and larger flowers.

Another method may be mentioned of propagating certain Primulas—those of the Candelabra and Cortusoides sections among others—which is more of interest than of practical value. In a few of the robust growers it may be found that the lower tier of the flower stem develops leaves as well as flowers, if the plants happen to be growing in very rich soil in shade. If the top of the upper part of the stem be removed, the leaves will develop and aerial roots will appear from the base of the tuft. When this occurs, the tuft should be cut and potted up firmly, when they will be found to strike root readily. They should be kept in a cold frame for the winter, and planted out in May, when danger from late frosts is almost over. This development is known as pelorial growth.

C. Propagation by Offsets.

The third method—by offsets—is not advised except in a few cases which respond to this method particularly well, as it entails much care if success is to result. Certainly, where a species is of a branching habit, and makes a number of offsets from one root stock, these may be detached with a heel and rooted fairly easily if placed in small pots plunged in ashes or fibre in a close propagating frame at the end of July. Several of the European species (such as *P. Allionii*, *P. auricula* and its varieties, and *P. marginata* and varieties) lend themselves to this method, but only those plants which show the branching habit should be used for the purpose. If the method is employed in other cases, the original plants may be lost in addition to the offsets which are taken. As an example of a species which has a single root stock and is of a branching habit, but which does not lend itself to increase by offsets, we may take *Primula Forrestii*.



PRIMULA FLORINDÆ (SIKKIMENSIS SECTION)

,Flowering in August. The leaves are fully developed and average seven inches in length. The size is entirely a matter of situation.

CHAPTER III

CULTIVATION

In the introductory chapter reference has been made to the wide geographical distribution of the genus Primula, and to the various situations where the plants have been found growing in the wild. They have been discovered in positions varying from sun-baked slopes and rocky ledges through many stages of light and shade and moisture to the darkest and wettest woodland. Correlated with this variation in habitat is shown a diversity in habit and growth, which in turn demands differing cultural requirements under garden conditions. For this reason, in order to supply as much information as possible, it has been thought better to subdivide the cultural remarks under definite headings, so as to cover the variation that exists in the cultivation of the many different species of Primula.

Many Primulas are of good temperament, and with a certain amount of care and attention will thrive successfully in almost any garden, provided that the soil conditions and the supply of light and moisture are to the plants' liking. There are others, also very desirable garden plants, which dislike average conditions, and demand special treatment. They should not, however, be omitted from a collection on that account. Once the cultivation of the majority of the more common Primulas has been mastered, and that is not a difficult task, then the field should be enlarged to include these fairly difficult representatives. In addition, there are now, or have been, in temporary cultivation a number of species whose wants we are unable to provide in the garden in the present state of our knowledge of their requirements. It must be realised that this difficulty is not due to any question of hardiness; rather is it caused by the lack of a sufficient winter and a definite break between seasons, as most of these stubborn species are plants of the high hills where extreme seasonal change is found.

As we cannot supply the necessary conditions outdoors, the obvious answer would seem to be to grow the plants in pots in a cold greenhouse where moisture and light could be controlled; but the objection is that very few hardy Primulas, other than some of the European species, will respond to pot culture. They may grow for a year or more, but soon they will call for a more extensive root run. Outside, these difficult species fall a prey to all manner of troubles, chief of which are our fickle spring and mild, damp winters. It is to be regretted that we cannot supply the conditions of a hard winter where for many months the plants sleep under a blanket of frozen snow, after which comes a period of warmth when the plant uncurls and expands its blooms. It is the hard winter that keeps the plant in good condition, with no alternating periods of frost and thaw such as are experienced in these islands.

The cultural requirements of Primulas may be discussed under three headings:

A. Soil.
B. Moisture.
C. Light supply.

A. SOIL.

Owing to the wide and varied situations in which wild plants are found, it is almost impossible to generalise and lay down definite rules regarding the soil to be favoured in their cultivation. The cultivator should be governed to a large extent by the appearance of his plants in the various stages of their life, and attempt to counteract the appearance of bad health by altering slightly the conditions of environment. We are as yet only in the experimental stages of growing many of the species of Primula. There is much to learn, and experience will in the end be found to be the best teacher.

The majority of Primulas will grow in ordinary soil conditions, and the gardener will seldom go wrong if a moderately rich loam is supplied. The poverty of a soil will always be evidenced by the poorness of the foliage. The plants will look weak and thin, whereas in a soil that suits them they will be robust, fat, and sturdy. One of the accompanying illustrations shows very clearly the type of foliage that may be expected if plants of the Candelabra section are grown in a soil of good heart which is to their liking. Most of the good extra-European Primulas, such as *P. japonica, pulverulenta, helodoxa, sikkimensis, Florindæ, chionantha, rosea,* thrive in a fat loam, if moisture and shade are right. Too much stress should not be laid on obtaining large, coarse leaves. Rather aim at a moderate leaf growth which will carry with it robust flower stems and more profuse flowers. Details about peculiarities of soil are given in the description of species in other chapters, but an average suitable compost will be found in a good loam mixed with leaf-soil, to which can be added a little sand if it is on the heavy side, and a little peat if it is inclined to be hungry.

Primulas and Lime.—The subject of Primulas and lime is a difficult one, chiefly from the fact that to many gardeners, particularly on the South Coast, lime means chalk. While some of the European Primulas have no objection to chalk, most of the extra-European species refuse to respond in a chalky soil. On the other hand, where the lime is present in a more insoluble state, such as is found in the hard limestone of Yorkshire, most Primulas are as easy to grow as in a lime-free garden. The same difficulty is being found with some of the Primulas from China as with a few Rhododendron species. They are both found in a limestone country, and yet transfer them to a chalky soil, and they quickly turn yellow and sickly unless raised beds of peat are specially made for them.

It is never safe to plant Primula species in a freshly limed soil, but the presence of more or less insoluble lime does not mean that you cannot grow Primulas, with the exception of a few definite lime-haters such as *P. glutinosa.* Most of the European alpine species, which are grown in the rock garden, will respond definitely to the presence of lime, but up to the present it is unknown what quantity and kind of lime other than chalk will affect the average woodland or bog Primula. Ordinary lime-dressing has no ill effect on Polyanthus and border Primroses.

Primulas and Peat.—Authorities seem to dispute the value of peat in the cultivation of many kinds of plants, and the general view now appears to be that a small quantity of peat, although perhaps beneficial, is by no means necessary. With Primulas this is undoubtedly true. There are very few species where peat must be present. Its chief use is in adding humus to hungry and light soils, as it lasts longer in the soil than leaf-mould. There is an undoubted improvement in a thin and humus-lacking loam by the addition of peat-moss litter, which is the most convenient form for garden use, and is much more porous and less acid than unprepared peat.

Primulas and Light Sandy Soils.—It must be remembered that few Primulas in the wild live in thin soil. They may prefer soil that is exceptionally stony and even dwell in rocky screes, but there is a vast difference between stony ground where what soil there is has a good heart and a thin soil with no nourishment. In a garden where the soil is poor it is little use planting Primulas without preparation of the soil, under the mistaken idea that nourishment can be added afterwards, either in the form of manure or of a mulch. Primulas in comparison with their size are deep-rooted plants, and so the subsoil must be rich enough to give them almost all the requisite nourishment. Poor soil should always be double trenched before planting Primulas, and the poorer the soil the more leaf-mould and other feeding material should be added. Lack of nourishment is often the cause of failure. The larger growing types, planted in permanent quarters, will benefit by an occasional surface mulch of well-rotted manure.

B. MOISTURE.

All Primulas are meticulous as regards moisture supply, and unless they have their wants attended to in the way of ample water in summer and an absence of excess moisture during the winter, the plants quickly become unhappy. In all cases there should be sufficient drainage to allow all the water necessary to pass through the upper soil. Primulas will not flourish in a soil suffocated with stagnant moisture, and not all species are like *P. rosea*, which thrives in a boggy situation. Insufficient drainage is the greatest enemy of all Primulas, and must be strictly avoided when making the site ready to receive the plants. Where the subsoil is clay it is not a bad plan to have a layer of broken clinkers or brick 16 to 20 inches below the surface. If the top soil is inclined to be heavy and sticky, a dressing of gravel and sharp sand will help to lighten it.

In our gardens Primulas of certain sections suffer badly from our wet winters and our fickle springs. Alternating periods of frost and thaw, combined with insufficient drainage, lead frequently to winter rotting of the crowns. The result is that plants exposed to this treatment die. They are consequently described as biennials, which is not really the case, though they must be treated as such. The Muscarioides section, represented by *P. Littoniana*, may be cited as an example. The representatives of this section refuse to survive the winter wet after flowering, and yet in the wild state they cannot be classed as true biennials.

In the wilds snow follows hard on the autumn frosts, and so the crowns are kept dry, whereas in cultivation the first autumn frost removes the leaves, and these fall and remain round the base of the plants. With wet conditions they gradually rot away and remain as a decaying collar round the crowns until decay affects the crowns themselves. While the cultivator may say that this is a natural state of growth, it is advisable to remove the decaying mass of foliage, as only harm can come to the healthy crown if it is allowed to remain. Accompanied in many cases with the removal of the foliage by frost, some of the roots have a tendency to shrivel and and die off, with the result that the crown loses its firm hold in the soil. This hold is gradually lessened by continuous frost action until such time as the crown is left free on the surface of the soil. To prevent this damage, the gardener must take a little trouble and see that any loose crowns are replanted firmly. After each hard frost the plants should be examined. This may appear to be a point of little importance, but it is surprising how many crowns are lifted by a hard frost, particularly in a porous and crumbly soil.

Another important point is to give such plants as show signs of winter rotting the protection of a pane of glass to keep off excessive moisture, which may lodge in the crowns and cause decay. This is very necessary in the case of species like *P. Winteri* where the plant never dies down entirely.

In the summer the soil in the bed or border where the plants are growing should never be allowed to dry out. The grower should be guided not so much by the state of the surface soil as by that of the subsoil. The latter should always be cool and moist. In long periods of drought the plants must be watered, and the surface soil frequent stirred with the hoe to conserve the moisture in the lower layers. A sufficient quantity of water should be given to moisten the subsoil thoroughly.

C. Light and Shade.

The problem of light and shade is inextricably bound up with the supply of moisture; so much so that there is little use giving consideration to one of the factors without the other, and both are dependent on local climatic conditions. If we take the average climate near London as a standard, it is obvious that in the west less shade and less artificial watering will be necessary, and that on the east coast, where drying easterly winds are prevalent at the start of the growing season, a little additional moisture will be necessary to ensure a good start.

It is in these two problems that knowledge of the individual plant is so important. Until recently it was generally believed that all Primulas should be grown in particularly shaded positions with little consideration paid to moisture and drainage, but it is now recognised that many of the European alpine species thrive in open and sunny situations, so long as the roots can be kept cool and comparatively moist. In the rock garden this can generally be met by giving the plants a fair amount of sun in an exposure that is shaded during the hottest parts of the day, thus avoiding the complete drying out of the soil in the crevices in which the roots are lodged.

Most of the Asiatic species will not survive in a sun-

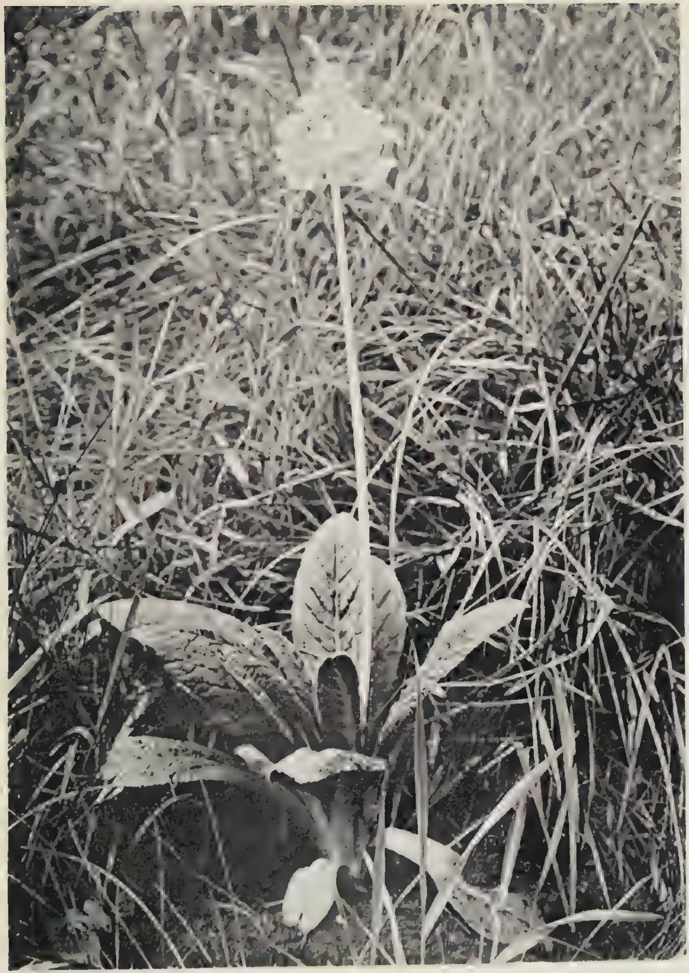


Photo George Forrest.

PRIMULA NUTANS (SOLDANELLOIDES SECTION)

As it grows in Yunnan in half-shade.

less situation. Here again the necessary amount of light and shade depends on the situation of the individual garden and partly on the quality of the soil. Almost all Primulas will require less shade when grown in a rich loam that does not easily dry out than in a light porous soil that powders after a few hours' sunshine. In the same way Primulas grown in a garden that faces west will stand more sunshine than in one with a southern aspect. Although it is impossible to lay down general rules, it may be taken that with a very few exceptions all Primulas like at least two hours' sunshine a day, wherever they may be planted. In a light soil that dries out rapidly that is the maximum that should be allowed woodland and moisture-loving Primulas such as *P. Littoniana* and *P. Florindæ.* Where natural moisture is in excess of the average, more sunlight can be given them. Primulas are very like other plants in that a certain amount of sunlight is necessary for their flowers and leaves. It will be seen, therefore, that the amount of light and shade is dependent on the amount of natural moisture in the soil in an average season. Where there is abundant moisture in the soil and in the atmosphere there is no harm in growing many of the so-called woodland species, such as are included in the Sikkimensis section, in an ordinary herbaceous border. Wherever possible dappled sunshine and shade should be given them ; by this we mean the effect given by sunlight shining through a tree with light foliage like the Birch. This gives them the requisite amount of light without drying up the soil too rapidly, for remember that the main object of shade is to prevent a dry root run.

Planting.—The planting of a Primula should receive as much consideration as the placing of a shrub in the soil. Do not be satisfied with scraping away a little of the soil and pushing the plant home with the thought that it will probably die in any case. All Primulas have long roots, and it is always a wise plan to take out sufficient soil to accommodate the roots without cramping them. See that the subsoil is well broken up, so that the roots will have no difficulty in penetrating down in search of moisture. Primulas should be planted deeply and firmly with the crown pushed well into the soil and the leaves forming a **V**-shaped arrangement. With large species single crowns should be planted not less than 6 to 9 inches apart, and the best display is obtained by planting in clumps of a dozen or more plants.

The best time for planting depends largely on how your stock is grown and the size of the plants. Probably the best time is in late summer or early autumn, when the soil is in a moist and warm condition, and the plants will become established in their new positions before the winter. On the other hand, growing plants in pots is often a nuisance during the summer months, and where your stock is not sufficiently numerous to grow on in frames or nursery beds, it is as well to get rid of your pot plants in late spring after they have been hardened off a little; but spring planting should only be done when all danger of hard frost is over.

If a period of drought occurs after planting, water the plants at regular intervals, and immediately after planting give the plants a good soaking. Moisture is extremely important until they are thoroughly established. Division has already been referred to in the previous chapter, and the transplanting of divided portions can be carried out from the end of July onwards, the earlier after flowering the better.

CHAPTER IV

THE POLYANTHUS AND THE COLOURED FORMS OF THE PRIMROSE

No work on Primulas would be complete without reference to these types which have for so long been favourites in our gardens, and which have done so much to establish the present popularity of the many representatives of the genus. It is to the true Primroses that graced our gardens long ago, and to the original Polyanthus or Bunch Primroses, that we owe many of the fine decorative varieties that are planted everywhere in our gardens today.

If we trace briefly the history and development of the various coloured forms of Primroses which are now obtainable, we find that they have travelled a considerable distance from the original type plant, the common Primrose, *P. acaulis* or *vulgaris*, which is to be found unfurling its beauty in the grassy banks beneath our hedgerows or in the woodlands in the spring of the year. Not only has the colour-range been considerably widened, but improvements have been registered at the hands of keen cultivators in the size and form of the flowers and in the general habit of the plant itself. Even now it would seem that we have not attained the perfect garden Primrose. Many growers are still working with the plant, and every year sees some fresh variety added of a new shade of colour. The colour-range is now extensive, embracing all gradations of pinks and crimsons, some approaching almost to a maroon-scarlet, while still more are of a delicate lilac-blue, merging into a murky purple. White and yellow varieties were first in the field, and these complete the most perfect colour-range that is to be found in almost any garden flower. Combined with this improvement in colouring is the more robust habit of the plant. The flower stems are longer and more vigorous, bearing the loose flower clusters well above the close-fitting leaf rosette, which greatly adds to the beauty and garden value of the plant. The flowers have been increased in size, almost doubled in some instances, and they are rounder in outline, although the original star-shaped types are highly decorative. Double forms also made their appearance many years ago, but these never seem to have crept into popular favour. They are attractive garden plants, quite as handsome as their single-flowered relatives, and show much the same wide colour-range. Of recent years, however, no doubt connected with the better knowledge that has been obtained regarding their cultural requirements, they are coming into their own. A number of varieties, with handsome double flowers of the most attractive shades, have been raised, and these are more vigorous in growth than the original double sorts. The lighter coloured varieties, such as the whites, yellows, and lilacs, will thrive successfully in any garden where the soil is not too light, but the darker coloured sorts—for example, the crimsons—are a little more difficult and require a fairly rich loam with plenty of moisture and some overhead shade, if they are to do really well. These double varieties require attention in the way of division of the large clumps, and they seldom succeed if allowed to become too large. They are certainly worth growing for their decorative value, and well repay any additional trouble that may be taken to coax them into vigour and blossom. Varieties of both types are numerous, and readers will find large selections of good standard sorts in the majority of nurserymen's catalogues. We would specially mention, however, the many blue varieties of Primroses that are to be had today, and in this connection pay homage to the name of Mr. G. F. Wilson, who did so much to make possible the appearance of a real blue Primrose. It was to the untiring efforts of this keen amateur and lover of the genus Primula that we owe the evolution of a Primrose that can be strictly termed blue. Although the origin of the blue type is not definitely certain, it is believed that they come from plants with flowers of a purple tint inclining to violet. This is the form of *P. acaulis* called *rubra* or *P. Sibthorpii* that takes the place of our common Primrose in the Caucasus and the Levant. The modern blue varieties show still further improvements on the original shades. The flowers are now wholly blue; the purple ring or eye which characterised the earlier types has been entirely eliminated, due to the efforts of many raisers. In place of it has come a ring of delicate pale yellow which shades into the pale blue of the petals, and which if anything enhances the beauty of the blues, giving it a character it might otherwise lack. These colour changes that have led to the production of the blue varieties seem to have been accompanied by an alteration in the habit and behaviour of the plants. These blue varieties flower early, a quality which certainly characterises all the true

Primroses, but they remain in bloom longer than those of other shades. This, of course, may only be a matter of cultivation and situation, but it is a point worth investigation by all who grow these attractive forms.

Every gardener knows the Polyanthus. There is no need to describe the handsome leafage and the elegant flower stems with their cluster of loose flowers at the summit of the stalks. It is in their distinct habit of flower carriage where they differ from the true Primrose, whose flowers are borne on single stalks. There are intermediate forms known as Polyanthus Primroses that show both flower habits, single-stalked flowers, and bunched flowers carried on the same plant, but at different times. These are not to be valued to the same extent from the garden standpoint as the true Polyanthus type. For a long time considerable doubt existed as to the true origin of the Polyanthus, but it is now generally accepted that it was the result of crossing the common Primrose, *P. acaulis*, with the cowslip *P. officinalis*. The flower character certainly bears out this evidence, as the flowers are open and flat and borne in clusters, thus combining the qualities of the two parents. Whether it originated as a natural cross or was produced artificially is not known. No matter, it is a first-rate garden plant, and it has been considerably developed and improved since it was first known in the days of Parkinson early in the seventeenth century. The colour-range in the Polyanthus has increased almost on the same lines as that of the true Primroses. It is even more extensive, and practically every shade to be found in the true Primrose is to be found in the Polyanthus. The colourings are richer and brighter, and the flower substance deeper. Double forms have appeared from time to time, but their cultivation has not been encouraged to any extent. The reason in this case is self-evident. The bunched flower character is sufficiently beautiful in itself without resorting to the doubling of the flowers, which make the head altogether too stiff and dense. Like the double Primroses, they are a little difficult to treat successfully, and probably on that account they have dropped out of popular favour. The development of the Polyanthus, like that of the true Primrose, has been largely due to the enthusiasm of many keen amateurs, and of the number no one has done more in the production of the modern Polyanthus than Miss Gertrude Jekyll, to whom we are indebted for the following account of the origin of the well-known strain of Munstead Bunch Primroses, the strain that has been largely used in the production of other fine-coloured plants now placed on the market by many of the leading growers in this country.

"The strain of large yellow and white Polyanthus known as the Munstead Bunch Primroses is the result of continuous careful selection. It was begun more than fifty years ago, when this form of Primrose was hardly known in gardens. It originated in a plant found in a cottage garden in or near the year 1875. Seed from this was sown, and the best selected again for sowing. It soon showed signs of improvement, and though a change of house some two years later made some interruption in its progress, yet from 1877 onwards the quality was steadily advancing. The colour of the strain ranges from a nearly pure white with a yellow eye to rich shades of deep yellow with the eye so brightly

A BORDER FILLED WITH A GOOD MODERN STRAIN OF POLYANTHUS

coloured as almost to approach a red. Some of the most refined are of a nearly pure canary colour all over. The form of the flower varies considerably; in some the bloom is almost flat and even-edged, in others it is waved and so deeply imbricated that it has some appearance of a double flower. An actual slight doubling occurs occasionally in the form of some small central petals, but this has not been encouraged, neither is an extreme size of bloom desired, though already there are some that are a little wider than a crown piece. The object of the continued selection is the production of a type of Primrose that shall be a well-doing and handsome garden plant.

"It is often a question among gardeners whether it is best to sow the seed as soon as ripe or whether to keep it till the following spring. In the garden where they are raised the soil is light and sandy, and has to be greatly enriched, preferably with cow manure. The strain is more vigorous in a stronger soil. Here it is found best to sow in early spring; the seedlings are then pricked out in a frame or a sheltered bed and planted late in July or early in August where they are to bloom."

From these white and yellow varieties of the Munstead strain raisers have obtained other desirable shades of colour which have greatly enhanced the value of the Polyanthus as a garden plant. There are many attractive shades of blue, while oranges, maroons, reds, and crimsons are frequent. In all cases the character of the flower is greatly improved by the quality of the eye. An eye of a colour contrasting to that of the petals is generally sought for, so that the plants present a greater attraction when grown in the mass. The thrum-eyed blooms where the anthers appear below the edge of the tube above the stigma are more valued for the same reason than the pin-eyed flowers. The eye in the case of the former type is more open and shows up to better advantage, especially when the petals form a distinct raised edge round the tube. Apart, also, from the actual doubling of the flowers, many interesting variations are to be noted in the physiognomy of the blooms owing to the arrangement and shape of the petals. There seems to be no cause for such disparity in form. It is not to be regarded as a disfigurement in any way; rather does this change in flower form add to the beauty of the plant.

It seems fitting to make reference to the old florist's Polyanthus, which is a plant more of interest than of value in the garden. Long ago it had its devotees, but now with the appearance of so many garden plants resulting from the development of the true Polyanthus which graces our gardens today, its culture has almost died out. In a way it has its attraction with its deeply coloured red or black petals prettily laced round the edges with gold, and with other special markings and a yellow eye. About five flowers are carried in a loose truss borne on a stem about 6 inches long. But our idea of what constitutes a good garden as well as a beautiful plant has undergone considerable change since the days when the florists' Polyanthus was the vogue, and for that reason, no doubt, it has fallen on evil days. Nevertheless, a small clump of these gold-laced flowers will look well in a spring border.

Regarding the position and situation for Primroses and Polyanthus in the garden, nothing much need be said. Their habits are sufficiently well known, and they are so commonly seen that the position suggests itself. The plants undoubtedly do best if they are given positions approximating as near as possible to their natural habitat. For this reason they thrive successfully if planted in a fairly moist soil and in partial shade under tall trees or as an edging to shrub borders, where they are not exposed to the full glare of the sun throughout the day. In the small garden they can be used along with other spring flowering subjects. They make an excellent edging to beds or borders of Daffodils or Tulips, and, indeed, they look most effective when planted up in variety in a bed by themselves. Those who have not tried the latter method of planting should certainly do so. Beds furnished solely with Polyanthus in mixed colours are as decorative, if not more so, than beds of Wallflowers.

The plants are of easy culture. They can be raised without difficulty from seed. In fact, seeds germinate like mustard and cress, and on that account must be sown thinly. After the seedlings have been brought safely through their younger stages, they can be transferred to the borders, planting being done in July or August, and the plants spaced out at distances of 6 to 9 inches between each. The Polyanthus are vigorous growers and lend themselves to division which should be carried out almost every year. This is an easy and rapid way of increasing one's stock of plants, and is the only method to employ when it is desired to increase the stock of any particular colour form. These coloured Primroses and the Polyanthus offer plenty of scope for experiment to the enthusiast. The whole field of raising seedlings of new and varied colourings is thrown open. Once the work of raising seedlings is begun, bringing in its train hybridising and selection in an attempt to produce a better and still better plant of richer and more novel colouring than its predecessors, it will never be cast aside.

CHAPTER V

PRIMULAS UNDER GLASS

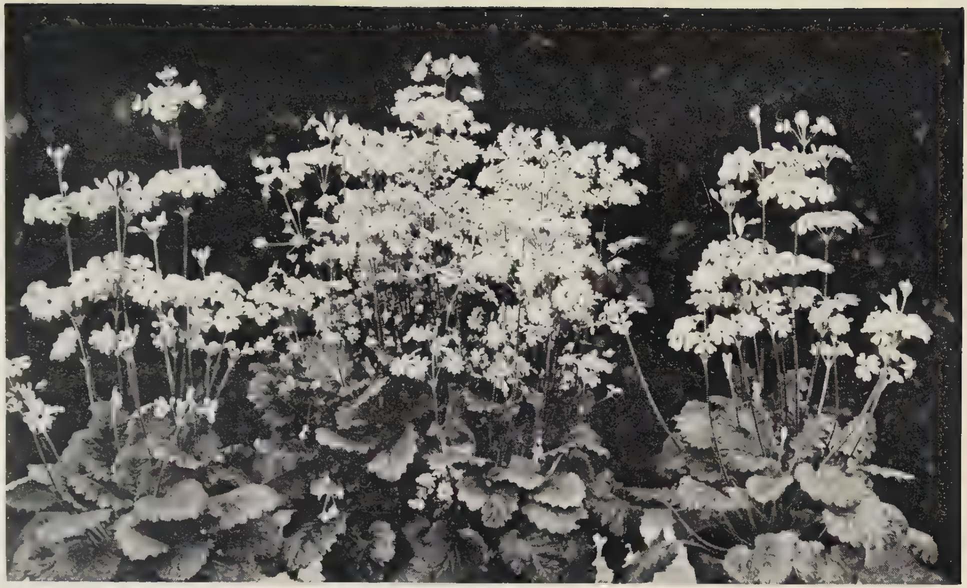
APART from the vast majority of Primula species which are hardy and thrive well out of doors in our climate, there are a number which, although they grow readily outside during the summer, will not stand the rigour of winter. They are only half-hardy, and require the shelter of a greenhouse to bring them to perfection and to keep them alive throughout the year. Not only for this reason are they to be relegated to the greenhouse; the species which comprise this group are all very decorative plants, and should be valued for their beauty in any greenhouse display. The greenhouse Primula today ranks as one of the essential inmates of any greenhouse collection that aims at being at all representative as well as decorative, and at least a few of the species should be grown in any collection, however small.

This increasing appreciation of Primulas as subjects for greenhouse decoration has come about largely by the wealth of colour that is now presented. It has arisen as a direct result of the wonderful transformation that has been wrought in many of the individual species themselves, by dint of continued development and hybridisation work carried out over a number of years. Great strides have been made in the improvement of almost every greenhouse type. The colour-range of several of the more desirable species has been considerably widened and improved. Varieties have made their appearance, both double and single flowered, with colourings far removed from those which characterise the type plants. There is a brilliance and a range of colour in the greenhouse section today, excluding a few varieties like *kewensis* and *floribunda*, that was absent several years ago.

The valuable feature of the group as a whole is their winter and spring flowering qualities. The fact that all the species can be had in flower during early spring endows the plants with particular value. Novelty in the greenhouse is to be sought after as much as in the garden, and if a welcome addition to the spring greenhouse display can be found in several of the Primulas, so much the better. No amateur should be without them; they are easy to grow and are decorative in flower, two points that should commend them to every gardener, and make for their extended popularity.

GREENHOUSE CULTURE

All the greenhouse species and varieties are best raised from seed sown during late spring, in May or June. The young plants resulting from fresh seed sown every year bloom more freely and are more desirable in every way than old plants grown on. If plants are desired, however, for a flowering display at Christmas, the seeds should be sown a few weeks earlier, about the beginning of April, so that a long growing season is obtained. This advice applies particularly to *P. obconica* and its varieties. Clean and porous pots or seed pans must be selected for the purpose, and crocks or other



FORMS OF PRIMULA MALACOIDES

In the centre is the type, while on either side are modern improved varieties.

coarse material added to secure good drainage. Fill up the pots with equal parts of loam and leaf-mould and a sprinkling of sharp sand, finishing off with a firm and even surface of fine consistency. The surface of the compost should not be more than about ⅛ inch below the rim of the pot, as a greater depth leads to damping off. Sow the seeds thinly, and only just cover them with a sprinkling of sand. Water either before or after sowing, by immersing the pots or pans in a basin of water up to the rims. Do not over-water, as this may lead probably to the floating of the seeds and to uneven germination. After sowing, cover the seed pans with a pane of glass shaded with brown paper, and place them in a warm greenhouse with a temperature of about 55° F. The glass covering will prevent excessive evaporation of moisture, and the shading is necessary during bright sunshine. It is better to have these preparations made at the time of sowing, and to disturb the seeds as little as possible between actual sowing and the time of germination. The germination period is a critical one with all Primulas, and the strictest attention must be given to temperature, light supply, and ventilation, if violent fluctuations in temperature are to be avoided, while a close, moist atmosphere with an absence of draughts, and shading during bright, sunny weather, are also necessary to ensure success.

If these instructions are followed, germination should be fairly even, and once the young seedlings appear, the glass covering must be removed and the young plants given all the light and air possible. It is best to place the seed pan on a shelf in the greenhouse near the glass to secure vigorous and healthy growth. During this period never let the seedlings suffer from lack of moisture, and keep them growing steadily. When they have developed their true leaves, they are ready for pricking off and transplanting. The largest of the seedlings should be transferred directly to 4 or 5 inch pots, one seedling in each pot, while the smaller ones are best pricked off into pans, or round the edges of 3-inch pots to promote further growth. The seedlings should be placed about 1½ inches apart. If the sowing has been done thinly, there should be no necessity for much pricking off. At this period the plants may be housed in a cold frame, where they remain during the summer. By this treatment the plants secure a firmness of growth that is absent from the plant kept only in the greenhouse. The plants should be watered at regular intervals, and protected from strong sunshine. Plenty of air most be admitted during the day and also at night, when the seedlings have become established. If the plants are grown on steadily, they will be ready for the final potting in a few weeks' time into 5-inch pots. Clean pots and ample drainage are again essential. When planting, care should be taken not to place the plants too deeply in the pots, otherwise the lower leaves, coming into contact with the soil, will decay. The crown of the plant should be about level with the soil in all cases, or just clear of it. Plant firmly, and, at the same time, make the soil of a moderate firmness, so that the plant will not topple over and will be secure without staking. If properly potted, Primulas do not require staking. Never allow the plants at any stage of their existence to become pot bound. Re-pot several times if necessary, making the soil compost a little richer on each occasion. A little well-rotted cow manure or a sprinkling of bone-meal will prove beneficial to the plants. In the final potting the rooting medium should consist of about three parts of rich loam, one part of leaf-mould with sand, and a sprinkling of lime rubble and bone-meal. The plants may be allowed to remain in the cold frame until about the end of September, when, as the evenings become cold, they should be transferred to a cool greenhouse, with a minimum temperature of about 45 degrees. Do not grow the plants in a high temperature, as Primulas prefer cool conditions at all times, so that the growth is sturdy. Allow the pots to rest on a staging, covered with ashes or gravel, to keep the roots cool. The greenhouse representatives resemble hardy species in that they like a cool rooting medium. Water carefully when necessary during all stages of their growth. Watch the plants for any signs of disease, either insect or fungoid. If green fly and white fly have been troublesome, they can be kept in check by fumigating lightly with calcium cyanide sprinkled on the paths of the house, but remember that calcium cyanide is a most potent poison to all animal life, including human beings, and so instructions given by the makers must be followed with every care. Fumigating should be done in the evening. All the ventilators of the house should be closed and the doors locked, and the atmosphere of the house should not be too moist. Although it may be assumed that Primulas are easy to raise and grow for greenhouse decoration, it does not mean that carelessness and inattention should be tolerated. If the plants are well cared for, they will repay all the time and trouble expended on them.

DECORATIVE SPECIES AND VARIETIES FOR THE GREENHOUSE.

Those species that are suited for greenhouse decoration, either by themselves or along with other subjects, are as follows: *PP. sinensis*, *sinensis* var. *stellata*, *obconica*, *sinolisteri*, *floribunda*, *verticillata*, *kewensis*, *malacoides*, *effusa*, *Veitchii*, *cortusoides*, and *Forbesii.*

It will be noted that many of the alpine species that are usually seen growing in a cool greenhouse or alpine house have been omitted from this list. These are not true greenhouse Primulas, and are treated generally later on, as they cannot be included as decorative greenhouse plants.

P. sinensis—one of the first Primulas to be introduced from the East—is peculiar in that no one ever appears to have seen the true wild type from which the cultivated forms have arisen. No wild specimens have ever been collected, but from descriptions it appears not to be a plant of any great garden value, compared to the cultivated varieties. It is a plant which has thrown an enormous amount of variation in its parental types. The colour-range of the plant has been widened almost indefinitely, so that some of the modern forms are particularly attractive. Unfortunately, it is true that many of the best of these, being the result of first crosses, are unstable, disappearing with the passing of the plants themselves. Varieties are to be had now in all shades of crimson, coral pink, blue, and white. Associated with the flower colour in many instances—for example, in variety *Etna*—is the darkening of the foliage which gives an added beauty to the plant. In the crimson and blue varieties a decided purity of tone has been reached, although the ideal shade in either case has hardly been attained. In the coral pink shades, on the other hand, our raisers have been more successful. Several varieties of a really good colour have appeared in much the same way as the pink forms have arisen from such hardy species as *P. pulverulenta* and *P. japonica*. One point to be noted with the more delicately coloured varieties is that they are of less vigorous growth than the deeper coloured forms, and for that reason should be given the protection of a greenhouse earlier than the others. The giant-flowered varieties appear to have reached such a stage in their evolution that they can scarcely be bettered. The flowers are large and decorative, full of substance and rich in colouring, and sit tight on cushions of rich green foliage, which lends additional charm to the plant.

Attractive as these varieties are, however, it is to the starry form of *P. sinensis* that we must look for a really decorative greenhouse plant. This form, known as *P. stellata*, really only a variety of *P. sinensis*, is of more value than the type, and breeds true. This variety carries handsome, star-like, long-stemmed flowers, which are borne in a series of whorls. This is now becoming a more popular plant than the type, on account of its more graceful habit and freer growth, and its more numerous flower clusters. The slender stemmed flowers showing all colour gradations are carried well above the foliage. Every colour that has appeared in the typical *sinensis* form is duplicated in the *stellata* group. All the older varieties that are the children of *P. stellata* show a starry eye in the centre of the flower, but in recent years one or two eyeless forms have been raised. These are interesting and attractive, and bear but small resemblance to any Primula. They are less free in habit, and when grown in the mass for greenhouse display, they have every appearance of gently falling snow. Several of these new varieties are destined to become popular, for few plants show such a kaleidoscopic colour-range, combined with an elegant habit and vigorous growth. Varieties showing all manner of doubling in the flowers are now to be obtained; forms with crested and fringed flowers have also been produced, but for general purposes the single-flowered types will be found to serve admirably. Many growers may be inclined to grow on these varieties from home-saved seed year after year, but when this is done it will be found that the colour will go back. It is better to purchase fresh seed year after year if good colour shades are desired. It is only by growing the plants in quantity that good seed can be obtained.

Turning now to *P. obconica*, which has undergone development at the hands of interested growers simultaneously with *P. sinensis*, we find that this species has been improved to such a degree that the modern varieties show little resemblance to the original introductions. The size of the individual blooms has been enormously increased. Some varieties have semi-double flowers, while others show all degrees of fringing of the petals. The colour-range is not so wide as is the case with *sinensis* varieties, and unfortunately, in many instances, varieties do not come true from seed, especially in the case of the white sorts; the flower has a distinct tendency to revert to the parental colour of a pale lilac or lavender. Despite its smaller colour-range it is an attractive plant. It has one drawback to its general cultivation, and that is the glandular hairs which are to be found on the under sides of the leaves. These cause an irritating and dangerous rash on the skin of some people who come in contact with the plant. There seems little doubt that only a few are susceptible to attack; most are immune, but it is advisable to handle the plant with caution. Unfortunately, this characteristic of the plant has led to its falling into disfavour in many gardens. There is no need, however, to cease growing *P. obconica* on this account. If irritation results through handling the plants, take steps to remedy the trouble by washing the affected parts with turpentine. Another cure which has been recommended is to use zinc ointment or boracic acid. It is a plant which objects to fluctuations in temperature, and it should be grown on in a cool house all the winter. It flowers over a long period, and by making successional sowings, or by keeping back a few of the plants and forcing others—for it is a perennial—it may be had in bloom almost all the year round.

A closely allied species to *P. obconica* is *P. sinolisteri.* This plant is of somewhat similar habit, but is much freer in growth, with more compact foliage, and carrying many trusses of flowers varying in colour from white to lilac. It is to be valued in those cases where *P. obconica* cannot be grown because of its irritant properties, as this species does not possess the irritant glandular hairs characteristic of its near relative.

Probably the most decorative primula for greenhouse purposes is *P. malacoides*, introduced from Yunnan by Forrest in 1908. It is undoubtedly one of the finest plants that has come to us from the East. Since its introduction, the species has passed through a period of intensive development, and the improvement has been so marked that the present-day forms bear little resemblance to the original wild type. Combined with a marked increase in the height of the plant there has been an increase in the size of the flowers, while the colouring has been enriched and deepened by continued selection over a period of years. There are now forms with double flowers, which are very effective for those who care for that feature. The plant fully deserves its name of the "Fairy Primrose." It is a dainty grower, carrying light and loose flower clusters rising on slender stalks which appear from the handsome rosette of basal leaves. The flower-stems reach some 18 inches to 2 feet in height, and when grown in the mass the feathery appearance is most attractive. The blossoms are a delicate rosy lilac. This is shown off to advantage by the white mealy calyx and white flower stems. Its culture is of the simplest, as it is almost hardy. It will thrive successfully in any cold greenhouse, and although it is a perennial, it is better to treat it as an annual. It blooms for several months in winter and spring, and seeds freely. A very close form, given the specific name of *P. pseudomalacoides*, should be carefully distinguished from the true species.

This form was discovered by Mr. L. B. Stewart, of the Edinburgh Botanic Garden. It is a plant not so robust in growth as the type, and it does not seed itself unless it is hand pollinated. Growers should be careful to select the seed from the more robust growing forms, as the stock can be readily increased, if the true plant is obtained. It is a Primula that no gardener who possesses a small greenhouse should be without. A closely allied species to the above is the new *P. effusa,* only introduced a few years ago by Forrest. As yet it is comparatively rare in cultivation, but once it becomes more widespread it is a plant which will become almost as popular as *P. malacoides,* which it much resembles, both in habit and flower colour. From its rosettes of leaves varying from 1 to 2 inches long, it pushes up as many as five or six slender flower stems reaching a height of 9 to 12 inches, which carry several whorls of long-stalked rosy or lilac-pink flowers. The flowers show great variation in colour, like *P. malacoides.* One or two of the plants in the batch which the writers are growing exhibit doubling of the flowers in varying degrees, thereby showing under cultivation the same tendencies as its better-known relative. The flower stems and stalks are coated with white meal. It is a most decorative species with its feathery sheaves of flowers, and is valuable for the reason that it flowers later than *P. malacoides.* Its flowering period extends from late May until about mid-August. After flowering the plant can be divided to increase the stock. Unfortunately, the plants do not appear to set seed unless the flowers are hand pollinated. If this trouble be taken, then a fair quantity of seed will be obtained, which if sown in July or August will produce a good stock of flowering plants the following year.

Another slender and handsome species similar in appearance to *P. malacoides* is *P. Forbesii.* In former years the latter was a common plant in the greenhouse, but it has been superseded by the former. The smaller leaves and the flower stem reaching some 14 inches high, carrying delicate lilac-coloured flowers, distinguish it from its near relatives. The flower clusters are not so open and graceful as they are in *P. malacoides.* It flowers profusely, commencing when it is quite young —some 3 or 4 inches high—and continuing until its full stature is reached. It grows well from seed, and blooms well all the winter. It should be given a corner in the greenhouse where there is plenty of light and space to develop, otherwise the flower stems become weak and spindly, and the plant loses half its beauty.

Of the yellow-flowered representatives, the outstanding one is *P. kewensis*—not a species, but a hybrid between *P. floribunda* and *P. verticillata,* which are the two species which make up the group. There are two forms of this Kew hybrid: (1) the original plants which are sterile and must be increased by division; and (2) the seed-producing form which is the one more generally known and grown. It is a free flowering and very decorative plant, and carries the characteristics of its two parents. It resembles *P. floribunda* in its robust and vigorous habit, and *P. verticillata* in its mealy appearance. From the handsome rosettes of leaves some 6 to 8 inches long, rise the tall flowering stems bearing three or four whorls of bright yellow flowers which are slightly fragrant. It is a fine flowerer in winter and early spring, and makes a charming associate for *P. sinensis* and *P. obconica.* To this colour scheme it adds a touch of particular charm; it is not fastidious in its requirements, and will grow in any good soil.

Both *P. verticillata* and *P. floribunda* are useful species for greenhouse decoration, but where *P. kewensis* is grown it is not really necessary to include them. The former reaches about 10 inches in height, and carries fragrant yellow flowers, while the latter is similar but more compact in habit. It only reaches about 8 inches in height, and the flowers are golden yellow and fragrant. *P. floribunda* makes a good pot plant and is worth including in a collection.

Two other good greenhouse primulas are *P. Veitchii* and *P. cortusoides*, and although these may be grown successfully outdoors, where they look particularly well in a shady situation, they make admirable pot plants. The former is a most decorative plant with its handsome lobed leaves and elegant flower stems bearing tiers of dark violet-magenta flowers with a yellow eye. The new *P. lichiangensis*, similar to *P. Veitchii* but with larger flowers, might also be tried. *P. cortusoides*, which is usually *P. saxatilis*, is another fine plant for indoor culture, with large leaves and light trusses of rose-coloured flowers. Almost all the species in this section take kindly to greenhouse conditions, and are certainly worthy of growing in a collection.

Although not strictly a decorative greenhouse primula, mention might be made of *P. Reidii*, still uncommon in our gardens. It is almost certain that this plant will not succeed outside in our climate. It loathes the cold and winter damp, and requires the shelter of a cool greenhouse. It is a most attractive plant when well grown, with its upstanding, thin, and membranous leaves, from which arise its several flower stems some 4 or 5 inches high, bearing nodding ivory-white flowers. It is a perennial species, and may be increased by dividing the young shoots that sometimes appear from the base of the plant, or by sowing seed in February or March. It does not commence to flower usually until the middle of April following the year after sowing. It may be grown as a pot plant or, better still, in an indoor rock garden where shade and moisture can be controlled.

Primulas for a Cool Alpine House.

There are a number of charming Primulas which, although easily cultivated outdoors in the rock garden, show themselves to equal or better advantage when grown under glass. They cannot be considered as true greenhouse plants, but the gardener who has sufficient glass space at his command should certainly include a few of the European alpine Primulas, or even a few of the ordinary species, in any display in the alpine house. Alpine house gardening is an interesting form of rock gardening. From a purely personal point of view, the keen rock gardener will find that this mode of gardening will afford him infinite pleasure. He can view and tend the plants easily and in comfort, and the disappointments are few. The full beauty of the house plant can be seen and appreciated. Points may be noticed about

A POT OF THE FINE HYBRID, PRIMULA LINDA POPE

An excellent plant for the cool alpine house.

its habit and characteristics which may escape the keen observer when the same plant is grown outside. In this way during the winter and early spring months the alpine house can be made to provide much of the beauty which is lacking in the outside rock garden at this time. In this form of gardening it is a moot point whether the culture of the plants in pans arranged on shelves or grown in an indoor rockery is the better. From a strictly cultural point of view, there seems to be little to choose between the two methods, and the selection of one rather than the other is largely a matter of personal taste. The criticism levelled against the culture of rock plants in pans is that it is not a natural method of gardening, and that the plants do not reach their full and mature beauty when confined to a small pot. With Primulas this is undoubtedly true, as on the whole the majority of species do not take kindly to pot conditions, although some of them will grow readily enough. Many species have a habit when grown in pots to make unequal growth, and for that reason are best grown in a rockery. For those with limited glass space, however, pan culture will be found more economical, as after flowering the pans can be plunged in a bed of ashes outdoors, and use can be made of the house during the summer and early autumn months for other purposes. When growing Primulas either in pots or in the indoor rockery it is advisable to add charcoal to the compost in order to prevent sourness of soil. On the other hand, the rockery has its advantages in presenting a more natural appearance, although it entails greater attention and upkeep, and calls for more time on the part of the cultivator. It must have ample drainage and a deep root run if the plants are to succeed, and should not be constructed near any pipes. For Primulas, however, it seems the ideal way of growing the majority of the European alpine species. To make a greenhouse rockery look natural is not such an easy task as it would seem; the whole idea calls for skilful arrangement and combination of plants and a careful selection of subjects.

Among the many Primulas suited for cultivation indoors for furnishing colour during winter in the alpine house, there is one species which stands out above its neighbours. *P. Winteri* is a plant for every cool greenhouse. It is most effective when grown in large pans that become smothered with its handsome foliage, which, later on, in January and February, is studded with large, pale, lilac flowers. Others to grow indoors are *P. rosea*, with its cluster-heads of rich rose flowers; *P. auricula* and its many hybrids; *P. venusta* and its varieties; *P. pubescens* and its varieties, of which the best is *alba*, with its round heads of pure white blossom which open in April; *Mrs. Wilson*, lilac-purple; *The General*, rosy red; and *Ruby*, a deep red; *P. Linda Pope*, with pure lavender-blue flowers and attractive silvery-edged leaves; *P. Allionii*, with large pink flowers and grey-green leaves; *P. marginata* and its hybrid form, *P. Marven*, of a dark violet shade; hybrids of *P. hirsuta*, —*e.g.*, *G. H. Wilson*, a splendid free-flowering variety, only reaching some 4 inches in height, but smothered in rich lilac-purple flowers in mid-April; *P. glutinosa*, with fragrant violet-blue flowers and glossy green leaves; *P. glaucescens*, with lilac-purple flowers, and *P. Forrestii*, with its glorious clusters of golden yellow flowers. All the foregoing make good decorative pots for growing in the alpine house. Many others given in the chapter on European Primulas could also be tried with success.

Several of the tall-growing representatives of the Candelabra and Sikkimensis groups can be grown in large pots and introduced for bold colour effects. But one should be careful not to grow on these same plants for a second year. After one year in the house transfer them outside. Young plants should be grown on specially for inclusion in the greenhouse, and they will flower the first year.

CHAPTER VI

EUROPEAN PRIMULAS

THE entire subject of European Primulas is fraught with difficulty, not only for the gardener, but also for the writer who attempts to deal with them in the space of a few pages. Botanists have had not one but hundreds of field days, when they have been let loose among European Primulas, and have showered names on them broadcast. In addition, so as to worry the would-be grower further, many species run into innumerable forms and varieties and cross naturally with other species of the same section. This makes the nomenclature of European Primulas very puzzling to the amateur; the same Primula may appear in several catalogues under different names; and the amateur, who may have gone to considerable trouble, at no little cost, in ordering what he fondly imagines he does not possess, may find that he has purchased several plants of a species that he has already in his garden. This is bad enough in the purchase of plants, but it is far worse in the case of seed, and the advice is given to beware of ordering seed of rare Primulas unless you are certain of the source of supply. There is no guarantee that the name is correct according to English nomenclature, and there is no certainty, even if the name is correct, that the seed will produce plants true to type.

In this chapter we only attempt to describe the commoner species, varieties, and hybrids which are likely to be found in cultivation and are useful to the amateur. Gardeners who become captivated with the intricacies of European Primulas, and it is a very fascinating hobby, and who wish to delve deeper into the subject, must consult such works as the "Primulas of Europe," by John Macwatt, M.B., the Report of the Primula Conference, and the many pages devoted to Primulas in Farrer's "English Rock Garden."

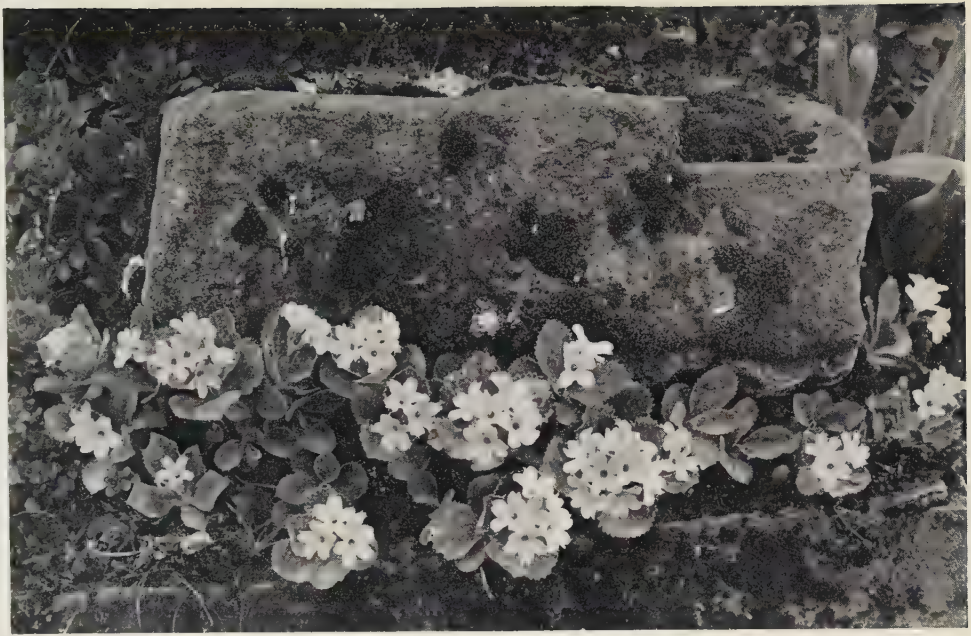
If we can generalise at all, we can say that whereas the majority of Primulas in cultivation whose native habitats are outside Europe are plants for the wild garden and thin woodland, the majority of European Primulas are rock-garden plants, and many succeed best when grown in the moraine. On this hinges much of the success or failure with European Primulas. As a rule, most amateurs fight shy of these species and consider them difficult plants, for the sole reason that they have an idea at the back of their minds that all Primulas must be treated as lovers of a good loam in a shady moist situation. If you try to grow any of the European alpine species in the same situation in which *P. Bulleyana* flourishes, you are bound to fail. The truth is that most of these alpine species like sun, and plenty of it; they also like cool and moist—but not stagnant—conditions at the roots during the growing season, and a moderately dry ground surface during the winter. That is why a moraine with its controlled water suits them so excellently. Many of them will grow equally well in an average rock garden, provided that the drainage is good, and they can get their feet down into a cool and moist subsoil. The advantage of a moraine is that the stone chips on the surface keep their collars dry during the winter, and so the danger from rotting is lessened. Undoubtedly most European Primulas will live far longer in a moraine than in a rock garden ; but even in the latter they will last for enough years to give ample enjoyment to the cultivator.

AURICULA SECTION.

This section is one of the largest in the genus Primula, and is divided into several subsections, whose names are of little importance to the amateur. So large a section is it that it is difficult to describe briefly and simply the main characteristics that divide it from other sections, but in the main the leaves are more or less coriaceous and fleshy, and the flowers are almost always borne in umbels of two or more flowers.

P. Allionii, from the Maritime Alps behind Mentone. The leaves are fleshy, very sticky, and are a greyish-green in colour. The large pink flowers are borne in an umbel of one to four flowers on a very short flower scape. It flowers in March and April. This is a difficult species to cultivate, but is well worth the attempt. It is usually found under overhanging rocks, and so gets no direct moisture, although the roots will be deep in a soil that is always damp from moisture percolating through the rocks. To be successful, we must try and imitate this situation. It must have practically no sun, and must not be exposed to the rain ; it must have perfect drainage and a good soil that is always moist. Such a situation is not so easy to find.

It is best attempted by planting *P. Allionii* in a perpendicular crevice between two rocks with a good root-run at the back. It has no objection to a little



PRIMULA MARGINATA (AURICULA SECTION)

As a crevice plant, a situation for which it is admirably suited.

sun if, in the winter and early spring, excess moisture can be kept off with the help of a pane of glass. Perhaps the best situation of all is under an overhanging rock facing north. It must have limestone. It can be propagated by seed or by offsets taken at the end of July.

P. auricula, an old favourite that stretches from the Alps to the Carpathians, and is the parent of our garden Auriculas. There are many forms and varieties, but the type is a wonderful plant with a flat rosette of leaves, more or less mealy, and fine heads of rich yellow blossoms, the throats of which are covered with a white meal. From this plant have been evolved forms and varieties and hybrids both by natural and by artificial means in such numbers that a description would require a volume to itself. No less than eighty-five "leading" varieties are mentioned in Nicholson's "Dictionary of Gardening," almost all of which, alas! have long disappeared. There are various theories about the evolution of the old-fashioned Dusty Millars of our gardens, and undoubtedly they were popular garden flowers in the seventeenth century, but whatever theories the experts hold, there is no doubt that the blood of *P. auricula* is strong in them. It is pleasant to see that these Dusty Millars and also the show Auriculas are slowly regaining much of their lost popularity. Stiff they may be, almost Victorian in appearance, but they have a charm that is very much their own. For those who wish to learn more about these garden forms there is an excellent account of their history and development in Dr. Macwatt's "Primulas of Europe."

The wild species and its various forms are most valuable plants in the garden, not only for their undoubted beauty, but because they are very easily pleased. They may flourish best in a rich deep pocket among limestone rocks, but they are almost as much at home in any deep and rich soil with good drainage, whether it be in full sun or in half-shade. They can be propagated either by seed or by offsets taken late in July. It should be remembered, however, that *P. auricula* crosses readily with most of the other species in the same section, and so plants should be segregated or hand pollinated if true seed is desired. There are two natural hybrids of *P. auricula* that are both popular in gardens and have in turn produced offspring which are of the greatest importance; these are *P. venusta* = *P. auricula* × *carniolica* and *P. pubescens* = *P. auricula* × *hirsuta*. In the former the colour varies, but the commonest shade could be called reddish-purple. It is, however, quite a good plant, and succeeds best in half-shade in a light porous loam. *P. venusta* and *P. marginata* are the parents of the really fine hybrid called *Marven*, a garden cross of good substance and magnificent colour, dark violet with a mealy white eye. The whole plant is usually farinose, and when it is in full bloom, usually in mid-April, it is one of the most striking of all Primulas. The second natural hybrid, *P. pubescens*, is even more important. It is more varied in form and colour than *P. venusta*, and innumerable varieties exist. Probably the most popular is the form called *pubescens alba*, usually named in catalogues and gardens as *P. nivalis*, a name that really belongs to an entirely different Primula, the type plant of the Nivalis section. *P. pubescens alba* is a very old plant in cultivation, with tight-packed heads of fragrant white flowers. It is an admirable plant for the rock garden, and has not the slightest objection to full sun so long as its feet can be kept moderately moist and cool throughout the growing season. Other varieties or hybrids—their parentage is lost in the mist—are *Faldonside*, a good crimson; *Mrs. Wilson*, smaller than most, with rich lilac-purple flowers; *Ruby*, a deep red with a white eye; and *The General*, rose with a brick-red tinge. These are only samples of a list that is staggering in its length. They all flower in April; and remember that there is no guarantee that the colours will come true if the plants are grown from seed.

P. carniolica, a fine Primula from the Idrian Alps, rare both as a wilding and in cultivation. The leaves are very smooth and very bright green, a good distinguishing mark; the scapes are tall, often 6 inches, and bear several large flowers of a lovely soft rose with an eye thick with white meal. In its native haunts it is a plant of shady rocks in woodland, but in cultivation it has no violent objection to sunlight so long as it is grown in a rich, moist loam. Indeed, this rich soil which it loves may tend to become sour if it is not periodically sweetened by a certain amount of sunshine.

P. Clusiana, a very fine lime-loving Primula from the Austrian Alps. The leaves are large and glossy green, paler in colour and with wider margins than those of *P. Wulfeniana*, its closest relative. The flower scape is about 3 inches tall, and carries from four to six large flowers of a rich carmine with a white eye. A characteristic mark is the deep division of the lobes of the corolla. This Primula is very easily grown in almost any kind of soil, so long as it is not acid. It must have a certain amount of lime. Farrer points out that many of these European Primulas suffer in gardens from being planted in too much shade. This is particularly the case with *P. Clusiana*. So long as the soil does not get too dry, it will stand almost unlimited sunshine, and so it can be grown both in the border and in the rock garden. It is easily grown from seed. There is a charming hybrid between this Primula and *P. minima*, sometimes seen in catalogues under the name of *P. intermedia*. It has large flowers of the palest pink.

P. cottia, from rocky meadows in the Cottian Alps. This is one of the group of Auriculas that is distinguished by sticky glands and long pubescence on the leaves and flower scape. It is very closely allied to *P. villosa*. The leaves are sometimes entire, but more often denticulate from the middle. The umbel is fairly tight, and carries a number of rosy flowers with tubes fairly long for the section. This is rather a rare Primula in cultivation, but is well worth growing. Like many sticky and glandular plants, *P. cottia* will stand a large amount of sunshine. It is a good rock garden plant, and prefers a fairly rich compost.

P. deorum, from the mountains of Thrace and Bulgaria. It is a large plant for the section with narrow, entire leaves. The flowers are a deep magenta. This Primula is mentioned because it is sometimes listed, but it is a troublesome plant, and is only fit for the specialist. It is seldom seen growing well in this country. Perhaps the best situation for it is in a pocket of rich soil of considerable depth by the side of a waterfall; but how many gardens can supply that? In other cases the rose-beds may be tried, an excellent last resort for difficult Primulas.

P. glaucescens, a very free flowering and hardy Primula from the Italian Alps. It is a fairly large plant up to 6 inches in height. The leaves are blue-green, with a distinct band or membrane around the edge. The flowers are rather thin in texture, but are large and lilac-blue in colour. This is one of the Primulas that grows exceptionally well in limestone country. It is a very common Primula in gardens, sometimes listed under the name *P. calycina*, which is really a more robust form. It is also one of the Primulas that grow best in a sunny, exposed position in the rock garden, and is thus useful for small gardens.

P. glutinosa, one of the best and, at the same time, most difficult of all European Primulas. It is a native of the Central Alps, and is always found on granitic formations—it is a violent lime-hater. *P. glutinosa* forms tight clumps of stiff, toothed leaves of a deep glossy green. The fragrant flowers are of a lovely violet-blue, and the lobes are deeply cleft. It is not free flowering even in the wild state, but its best chance of success in this country is to grow it in a moraine. It will also grow in a pot in a cold frame, if a compost of three parts peat to one part sandy loam is used. There are a few Primulas with which it is worth experimenting, even if you have no specialist tendencies, and this is one of them. It is so aristocratic and so lovely in flower that any amount of trouble is amply rewarded, if you can only get it to take kindly to what you can supply in the way of situation, water, and soil.

P. hirsuta, a widely spread species from the Pyrenees, the Central Alps, and the Austrian Alps. It varies considerably, and this variation has given rise to innumerable names, among which *P. viscosa* is, perhaps, the most common. The real *P. viscosa* is a totally different plant, although superficially it bears some resemblance to *P. hirsuta*. The leaves of *P. hirsuta* are broad and ovate, narrowing sharply to a petiole. The flower stem is short, a good distinction, always shorter than the leaves; the umbels are many flowered; and the blossoms are mauve or bright rose, and occasionally white, with a long corolla tube. The plant is sticky throughout. This Primula prefers a rocky situation, and the rocks should be granitic. It is admirable in any rock garden where its roots can get under stones or rocks with its head exposed to the sun. There are a number of natural hybrids of *P. hirsuta* and *P. viscosa*, among them *P. Berninæ*, with fewer but larger flowers.

P. integrifolia, an Auricula that is found wild in the Engadine and the Pyrenees, and by no means one of the best, although it is sometimes listed. The leaves are broad, and are fairly bright green without a membranous edge. The umbels usually only carry two or three flowers of a washy rose-lilac with a white glandular throat. It thrives quite well in cultivation in an open situation in a porous peaty soil, but it is not of much importance.

P. Kitaibeliana, a rare Primula from the Balkans, but occasionally seen in catalogues. It is a near relative of *P. integrifolia*, but the leaves are more oval, and are yellowish-grey in tone. They are very sticky, and have a rather unpleasant odour. The rose-coloured flowers are carried on a very short pedicel. It is a better plant than *P. integrifolia*, and grows quite well in the rock garden in semi-shade.

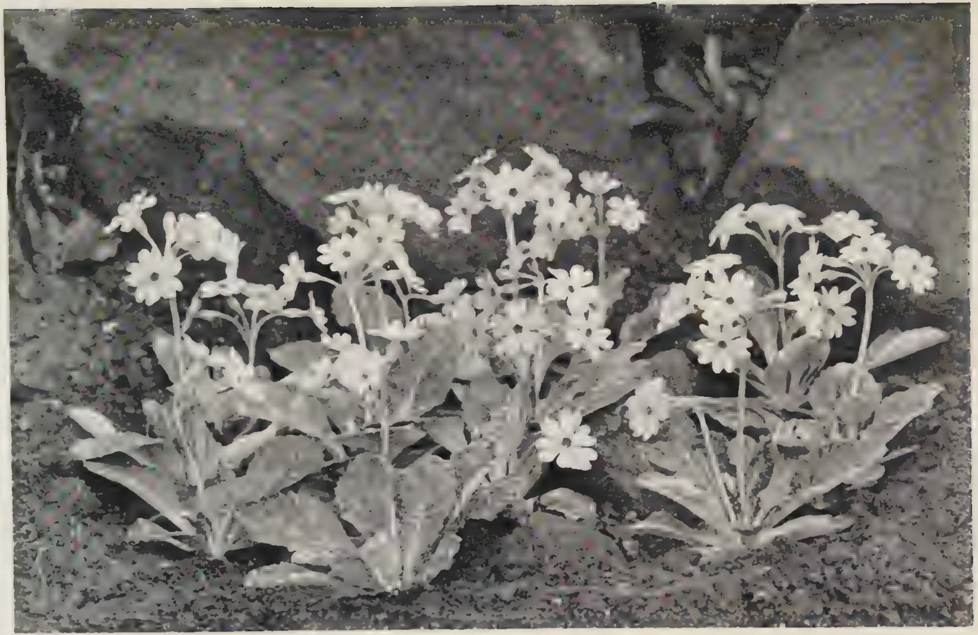
P. marginata, an old favourite in gardens. It is found wild in the Maritime and Cottian Alps. This is one of the Primulas that might almost be called sub-shrubby, as it forms long rhizomes and woody stems. The leaves are large, leathery, and clearly toothed. The young foliage and the margins of the old are covered with meal. The flower heads are large and loose, and the blossoms are of a lovely shade of lavender-blue. This admirable Primula is very easy to grow, but its sub-shrubby habit proves it to be a plant for rocky ledges. It is seen at its best if it is planted in a pocket behind, and on a level with, a rock over which its branches can push out. In this way it will form a mat. If it is planted on the level, it will require replanting every year, as it is inclined to grow out of the ground. It is certainly one of the best Primulas, and no rock garden should be without it. It likes sunshine. There is now in commerce a robust growing so-called white form, but it is not a good colour, being rather dirty-looking.

P. marginata is a parent of a number of hybrids, some of which are mentioned elsewhere, but one is pre-eminently lovely; this is the Primula called *Linda Pope*. In this the foliage is even more toothed and covered with white meal than in the case of the parent, while the flowers are larger and the flower scape is stronger and more erect. The flowers are a clear lavender-blue with a white eye. This hybrid should be propagated by division or by offsets; the species may be propagated by the same methods or by seed, but it is very variable, with some forms far better than others. At the start it is better to buy a particular selected form, and then it can be propagated by division or by offsets.

P. minima, a dwarf Auricula that is widely spread through the Austrian Alps down to the mountains of the Balkans. It is found both on granite and on limestone. It has tiny rosettes of glossy leaves, and bears one or two large flowers on a very short scape. The colour varies from a very pale rosy-pink to a deeper rose-lilac. *P. minima*, for all its loveliness, is not an easy plant to grow. It should never be left in splendid isolation, but should be planted among Gentians, Androsace, or Dianthus. It likes a light peaty loam with plenty of water in the growing season, and abundant sunshine. These are not conditions which it is always easy to supply. *P. minima* will not grow in a moraine.

P. œnensis, a species from the Western Rhætian Alps. It is similar to, but not so good as, *P. hirsuta*, from which it differs in having narrower leaves and fewer flowers to a head.

P. Palinuri, a close relative of *P. auricula* itself. It is a rare species from the Apennines. This is a large Primula, and another of those which might be called sub-shrubby. The leaves are very large, light green, and rather thin in texture. The deep yellow flowers are borne on tall flower scapes, sometimes a foot high. It is quite hardy, but requires shelter from the wind. It prefers a light, sandy loam, and should not be grown on the level. It is propagated by seeds or



PRIMULA FRONDOSA (FARINOSÆ SECTION)

Growing in a pocket in the rock garden. Note the distance apart they are planted.

by offsets. This Primula does not flower until it is of some size.

P. pedemontana, a very fine species from the Graian and Cottian Alps. The leaves are glabrous, and the distinguishing mark is the presence of reddish fur on the edge of the leaves. The flowers are carried in a loose head. The colour is a bright pink with a white eye. This Primula does not bear transplanting well, and takes some time to establish itself, but it is magnificent when it is completely at home. It prefers a mixture of loam and peat, and must have moisture during the growing season. Full sunshine is a necessity.

P. tyrolensis, a near relative of *P. Allionii*, from the limestone Dolomites. Although easier to grow, it cannot compare with the beauty of *P. Allionii*. It is a small plant with almost round, sticky leaves and thin, rose-lilac flowers. It will grow in the moraine or in crevices between the rocks exposed to almost full sunshine. If you can grow *P. Allionii*, do not bother with *P. tyrolensis*.

P. villosa, from the Eastern Alps. A very close relative of *P. œnensis* and of *P. hirsuta*. The flower stems of *P. villosa* are taller than those of *P. hirsuta*, and the fur is coarser. The flowers are large and rose in colour. It will thrive under the same conditions as *P. hirsuta*.

P. viscosa, a widely spread alpine species that is almost always wrongly named. The leaves of real *P. viscosa* are without meal, floppy, rather smelly, and greenish-yellow in tone. The flowers are carried on a long scape on a one-sided umbel, and are deep-violet in colour. It is quite a good, though rather coarse, plant, and flourishes well in a warm, porous loam to which some gravel has been added. It has no objection to limestone. Varieties that are sometimes seen are var. *pyrenaica* and var. *graveolens*, no better than the type.

P. Wulfeniana, a low-growing species from the Eastern Alps. This is a limestone species. It grows in flat mats with glossy foliage and large flowers of a good rose-lilac. This is a better plant than its relative, *P. glaucescens*, and it flourishes under much the same conditions. It grows either in crevices in the rock or in fibrous loam. It is certainly an attraction in the rock garden.

FARINOSÆ SECTION.

The leaves of this section are almost always glabrous; the flowers are usually flat-faced, and are borne in umbels considerably higher than the length of the leaves. The three European species that are described require various situations, so these are dealt with in the descriptions of the individual species. If suitably situated, they are all perennial in cultivation. They set seed with great freedom, and the seed germinates well and quickly. They may also be increased by division.

P. farinosa, the Bird's Eye Primrose. The widest spread of all Primulas; found in England, Scotland, throughout Europe, Asia, and America. There are many forms, some being accorded specific rank as microforms of *P. farinosa*, such as *P. magellanica*, from the Magellan Strait. In England *P. farinosa* is comparatively common in Yorkshire and Westmoreland; it is found in some parts of Wales, and less often in Southern Scotland. The leaves vary in size; they are glabrous above and covered with meal below. The scapes are fairly stout, and are considerably longer than the leaves. They bear fairly tight umbels of flat-faced flowers, ranging from a good pink to a lilac, all with a yellow eye. The scape is mealy. This is one of the best of our native alpines, and like so many of our own wildings it is not very partial to civilisation. In some gardens it obstinately refuses to give of its best, however carefully it is cultivated. Some authorities advise you to grow it in a gritty, peaty loam; others in a rich loam. Sunshine is necessary, and so is abundant water at the roots during the growing season. Undoubtedly it is one of those Primulas that must not be grown in isolation.

It is unnecessary to mention the various named forms of *P. farinosa*, as they are rarely seen in gardens, and their cultivation is the same as the type. There is one form, however, that is sometimes given specific rank; this is *P. farinosa* var. *scotica*, which is found in the very north of Scotland and throughout Scandinavia. It is like a dwarf *P. farinosa*, with slightly larger flowers of a deeper tone with a more brilliant yellow eye. Lovely though this little morsel is, it is more difficult to grow than the type, and seems to prefer drier conditions. It is essentially a community plant, growing as it does in a wild state in short turf. *P. farinosa* var. *scotica* breeds true from seed, but in this case germination is long, and seedlings often do not appear until the second year. It should always be treated as a biennial, as it often dies after flowering.

P. frondosa, a species from Thrace. In appearance it is like a coarser *P. farinosa*, densely farinose on the under-surface of the leaves, and more free flowering in looser heads. The colour has more blue in it than has that of *P. farinosa.* It is much more easily grown, and will succeed in almost any soil and under any conditions, so long as it is not waterlogged in the winter. It germinates very freely, and will seed itself where it is thoroughly at home. It is a valuable species for the garden.

P. longiflora, a species from South-Eastern Europe and the Caucasus. The leaves are larger than those of *P. farinosa,* and are carried in a tighter rosette. The flowers are also larger, almost violet in colour, and with a long tube, a conspicuous distinction. This is an easy Primula to grow under almost any conditions, so long as the ground is not too wet in winter. It will flourish either in the rock or the bog garden. It is much beloved by slugs. Like other members of the series *P. longiflora* should be grown, wherever possible, in broad clumps, as massed planting shows up their beauty to best advantage.

VERNALES SECTION.

P. acaulis, the common Primrose, is so well known that it requires no description. Apart from our own wilding, there are many forms in cultivation today. Various so-called improvements on the type have occasionally been found growing wild, and have been introduced into cultivation under fancy names, but whether the common type can be improved is a matter of personal taste. The best of these wild forms is one called *Evelyn Arkwright,* a pin-eyed plant with a long style, of good colour and enormous size. These special forms, of course, do not come true from seed, and can only be increased by division.

There is also a form from the Caucasus, called *P. acaulis rubra*, and originally given specific rank as *P. Sibthorpii*. This varies in colour from pink to rose, and is probably a parent of all our coloured Primroses. *P. Sibthorpii* flowers early in February, and so should be given a sheltered situation. The flowers will stand a good deal of frost.

P. elatior, the Oxlip. Botanists will never cease arguing whether this is a natural species or a cross between the Primrose and the Cowslip. The Oxlip is a fine native, and is a good plant for the wild garden or the border, but it is a little too coarse for the rock garden.

P. leucophylla, a fine Oxlip from the Carpathians. The difference between it and the Oxlip is the presence of a white hairy tomentum on the under-surface of the leaves. The flowers are a good rich yellow. It seeds itself freely in this country, and is a good plant for the edge of the rock garden.

P. officinalis, the Cowslip. Another popular native, and excellent for naturalising in the wild garden, but hardly of good enough quality for garden work. Many forms are in existence, but they all have the same fault from a garden standpoint in having an enormous calyx that detracts from the beauty of the flower.

CHAPTER VII

EXTRA-EUROPEAN PRIMULAS

THE AURICULATÆ SECTION.

THIS section is not to be confounded with Auricula, which contains many of the best European Primulas. Most of the Primulas of the section Auriculatæ grow in clumps or tuffets, with clusters of little leaves, from which rise flower scapes anything from 4 inches to 12 inches in height, topped by a graceful but fairly packed umbel of rather flat blossom, with the petals very deeply cut.

SITUATION.—These are the most marsh-loving of all Primulas, although here again the term "marsh" must be qualified by saying that there must be some drainage. Some of them have no objection to a certain amount of sunshine, but all like copious moisture, particularly during the growing season. They are admirable plants for the waterside, or for a cool, rich, moist situation towards the bottom of the rock garden. Although each individual plant is on the small side, yet they spread rapidly in ever enlarging tuffets, and so plenty of room must be allowed for their expansion. They are absolutely hardy, and are perennial, with the possible exception of *P. conspersa* and more especially *P. luteola*, which shows its distaste of a superabundance of winter moisture by disappearing.

PROPAGATION.—Primulas of this series come readily from seed, but the important members enlarge their tuffets so rapidly that division is the simplest method of propagation.

Species.—*P. chrysopa*, introduced by Kingdon Ward from North-West Yunnan. This is a close relative of *P. involucrata*. The flowers are of a pleasant pale lilac shade. It is very free flowering, and sets seed regularly, which germinates freely.

P. conspersa, introduced by Purdom from Western Kansu, from 8,000 to 9,000 feet. This is a rare plant in cultivation. The leaves are about 1½ inches long and ½ inch wide, coming gradually to a point. The flower scapes are 8 inches to 1 foot in height, and the colour is pale lilac with a golden eye. This fine plant cannot be called absolutely perennial, and it is always safer to save seed every year.

P. involucrata, an early introduction from the Himalayas, and one of the best of all Primulas. It has small oblong leaves, dark green and very glossy, and from these rise 6-inch scapes and pure white flowers, large for the size of the plant, and delicately fragrant. This Primula rampages in rich moist soil, and is extremely free flowering and absolutely perennial; indeed, it is one of the easiest of all Primulas to grow. It is known also by another name, *P. Munroi*, under which it is sometimes listed. This is the Himalayan member of an aggregate that consists of *P. sibirica* from Northern China and Siberia, and *P. Wardii* from China. They are all closely allied botanically, and like identical conditions.

P. luteola, introduced from the Eastern Caucasus in 1867. The foliage is much the largest in the section, the leaves being 6 to 8 inches long. The flower stem is 8 inches in height, and bears a dense umbel of large soft yellow blossom. This admirable plant has the added advantage of flowering during July and August. So fine is it that one wonders why it is not more popular in gardens, as apart from danger from winter rot it is extremely easy to grow.

P. rosea, by far the most popular of all the members of this series. Botanists deny us the name of *rosea*, and say that it is a garden name for a collection of closely allied species and forms that come from the Himalayas. There are undoubtedly two forms in cultivation, identical except in point of size, and *rosea* is such an established name that botanical nomenclature need not worry us. The tufts of small glossy leaves and the heads of wonderful pink-carmine flowers make *P. rosea* one of our half-dozen best Primulas. It luxuriates in a rich, moist soil, and although good in the rock garden, it is at its best near water, where it can almost get its feet into the moistest of soils. Both forms are good; if you prefer an 8-inch flower stem you will get the larger form, sometimes listed under the name "grandiflora." No garden should be without this Primula. So long as the soil is moist *P. rosea* will stand a large amount of sun, which suits the colour.

P. sibirica (see *P. involucrata*). *P. sibirica* is hardly worth the name of a garden plant, so infinitely preferable are the other two members of the aggregate. Its flowers are few in number, and are usually pale pink.

P. tibetica, a very variable Primula from Tibet. It

A COLONY OF PRIMULA INVOLUCRATA (AURICULATÆ SECTION)

Growing in well-drained soil by the waterside.

is not very common in cultivation, but the form most often seen is a good one, with a dense tuft of small leaves and flowers on a very short flower scape, large for the size of the plant, and either pink or pale lilac in colour. It dislikes winter wet, and is more a plant for the edge of a moraine. Seed should be saved every year.

P. Wardii, first introduced by Wilson and later by Kingdon Ward. It is fairly widely spread on the Chinese-Tibetan borderland. In size the Primula is larger than *P. involucrata*. The colour varies from pink to a pale lilac. This is quite common in cultivation, but it would probably be more popular if it were grown in the mass. It does not enlarge quite so quickly as *P. involucrata*, and sometimes the colour is inclined to be a little washy, but it is a valuable plant all the same. It likes exactly the same conditions as *P. involucrata*.

THE CANDELABRA SECTION.

From a garden point of view this is the most important section, not only because of the decorative value, but also owing to their hardiness, and the ease with which they can be propagated. The leaves of all the species in this section are very like those of the common Primrose in shape. From the centre of the cluster of foliage ascends a tall flower scape, on which are produced at intervals whorls of stalked flowers ending in an umbel. The number of whorls depends on the species, and also on the situation in which the plant is grown. The scape usually continues to grow after the flowers are over until the seed ripens.

Situation.—All the species of the Candelabra section are plants of the moist meadows that occur so often on the edge of forests or among Bamboo from 7,000 to 12,000 feet in the Himalayas, the mountains of Upper Burma, and in Yunnan. While absolutely hardy, there are certain definite conditions which suit them best in cultivation. Briefly, they like a good moist loam with ample drainage, situated in half-shade. It is true that they will grow and flower in full sun, provided that the soil contains a certain amount of moisture, but the foliage will be poor and the number of whorls will be few, compared to those on plants that are grown in a more shady situation. On the other hand, a warning must be given against a stagnant situation, as in the winter excess of moisture that has no outlet will cause rotting of the crowns. Owing to their robust habit Primulas of the Candelabra section are hardly suitable plants for the rock garden unless they are planted at the edges, where other plants of a moderately coarse growth are grown. They are admirable for the wild garden, or by the stream and pondside, and are often useful for growing among shrubs, so long as the soil is fairly rich, and does not get too dry.

Propagation.—Primulas of this section set a large amount of seed which germinates readily. In situations that are to their liking they will seed themselves freely on open ground around the parent clumps (see note at the end of this section on hybrids). They may also be divided after flowering in late summer.

Species.—*P. anisodora*, found by Forrest in the Chungtien plateau in Yunnan, from 10,000-11,000 feet.

It is not a very striking plant except in colour, which is a deep plum-purple, perhaps the darkest shade in any Primula, with a yellow eye. It has a strong scent of aniseed. It is not so robust as most of this section, the average height of the flower scape being 12 to 16 inches. From its colour it might be imagined that *P. anisodora* might produce some excellent progeny when hybridised, but as far as is known this has not been attempted on any scale. It is as well to grow a fresh batch of plants every year, as in a damp, open winter this plant suffers.

P. Beesiana, found by Forrest in Yunnan. It is difficult to know what to say about this Primula. "When it is good, it is very, very good; and when it is bad, it is horrid." In any case, it is so fond of crossing with any other relative in sight that it is very doubtful if true *P. Beesiana* exists in cultivation today. There is a form introduced by Kingdon Ward with pleasant rose flowers and long, narrow leaves, with a distinct pinkish tinge to the midrib; there is also a deep magenta form, almost a purple, but as a rule the colour is muddy, and not fit to be seen in any respectable garden. If by any chance you possess a good form, it should always be propagated by division, and never by seed. It is rather a coarse growing plant.

P. Bulleyana, found by Forrest on the Lichiang range in Yunnan, from 10,000-11,000 feet. A magnificent, vigorous species, with flower scapes up to a yard in height. This also is a bad species for crossing, but the colour of most of its progeny is good, so its loose habits matter little. The colour of the buds of the true species is a deep reddish-orange, and the flowers open a deep orange-yellow. It is a robust plant with large leaves, broader than those of *P. Beesiana.* It should be extensively grown. The colour is usually better if it is not grown in direct sunlight.

P. burmanica, found by Kingdon Ward in Upper Burma at about 8,000 feet. This is another vigorous species that is also neat in habit. The flower scapes are usually 2 feet 6 inches in height, and rise from a fairly compact cluster of leaves not quite so large as those of *P. Bulleyana,* which they resemble in shape. The colour is a rich red-purple, with a yellow eye. The whorls are usually very numerous, and are not carried so wide apart on the flower scape as in most Primulas of this series. Another characteristic is the very distinct calyx with long-pointed lobes. This fine species has not been in cultivation for very long, and so the strain is at present true and the colour does not vary. In fact, so far, in our experience, it does not seem to be prone to crossing. It is worthy of a place in all gardens, particularly as it will flourish in more sun than do most of the series. It is absolutely perennial, and a fresh stock need not be raised every year.

P. Cockburniana, discovered originally by Pratt, and introduced by Wilson from Western Szechuan. This is the smallest of the Candelabra section, usually not exceeding a foot in height. The flowers are small, but the colour makes up for any lack of stature. It is a fiery orange of great richness. Although quite hardy, it is a short-lived plant, and should always be treated as a biennial, although in a situation to its liking it will flower for two years. Good drainage and half-shade is absolutely essential. Self-sown seedlings are sometimes found.

P. glycyosma, a Primula nearly akin to *P. Poissonii*. The colour is a velvety crimson, and the leaves are scented. The true species is very rare; but from the garden point of view *P. glycyosma* = *P. Poissonii*.

P. helodoxa, found originally by Forrest in Western Yunnan, where it has a wide distribution. This is probably the most "fixed" of all the species of the Candelabra section. It is extremely vigorous, free flowering, and seeds itself very freely without contamination from other species. The height in cultivation is about 2 feet, and the colour is a rich golden yellow. It is admirably adapted to streamside cultivation, where it can increase naturally. As it does not hybridise, it is best propagated by means of seed. This admirable and graceful plant must be placed among the best dozen Primulas in cultivation.

P. japonica, a species originally described in 1859. It is found in the central and northern portions of Yeso, in Japan. It is one of the most hardy and robust of plants; and while good forms of a rich red are seen, most of those in commerce are worthless. For this growers are to blame, as selection by private gardeners has proved that in course of time a good form can practically be stabilised. When seedlings of so-called *P. japonica* flower, all those that do not reach a good colour standard should be ruthlessly rooted up and burned. It is only by this means that a good strain can be kept. Moisture is not so essential, but a moderate amount of shade should be given.

P. Poissonii, found by Delavay near Tali in Yunnan at 9,000 feet. A robust species that seeds itself freely in damp ground. It is not so particular about drainage as most of the section. Like many of these reddy-purple Candelabras, the colour of *P. Poissonii* varies considerably. As a rule the paler forms approach a washy magenta that is unworthy of garden cultivation, but some of the deeper shades, which are nearly plum colour, are worth growing. *P. Poissonii* will stand a large amount of sun. Here again, if you have a good form, it should be propagated by division. It is very closely akin to *P. glycyosma*, and there is yet a third species, *P. Wilsoni*, from further north, that is so nearly allied as to be almost indistinguishable in cultivation.

P. serratifolia, found by Delavay near Tali in Yunnan at 12,000 feet. This is a very rare Primula in cultivation. Its height is about 2 feet, and the colour is pale yellow, usually with a lemon stripe on each lobe. It is as hardy as the rest of them, but is not quite so good in cultivation as *P. helodoxa*.

P. Smithiana, found in the Chumbi valley in the Eastern Himalaya. This might be called the Himalayan equivalent of the Chinese *P. helodoxa*. It is a smaller plant in every way, but the colour and habit are exactly the same. It is certainly no better than *P. helodoxa*.

P. pulverulenta, found by Wilson on the Chinese-Tibetan border. This is one of the most important of the Candelabra section. It is very robust and tall, the flower scape often reaching 3 feet or more. In colour it varies from a good pink, through magenta and rose to a rich crimson. It is a very accommodating plant, and may be treated as a true perennial. Much of its importance lies in the fact that it is the only Candelabra on which definite work has been accomplished in producing and fixing a good strain, for which we have to thank Mr. G. H. Dalrymple, of the Bartley Nurseries. By dint of strict selection he has raised several magnificent forms, among them Lady Thursby, of which a very large percentage come true to colour. Most of the colours are soft shades of pink and salmon.

HYBRIDS.—So readily do many species of the Candelabra section hybridise that usually the seedlings must be treated as suspect, in that they may not come true to type. This point has been dealt with more fully in the chapter on propagation. But stress must be made on differentiating between hybrids and species that vary so much that there is little doubt that they are still in a state of flux and are not "fixed." As examples let us take *P. japonica* and *P. Beesiana*. The former undoubtedly varies enormously, but there is every reason to believe that no true hybrid of *P. japonica* is known. In a wild state this Primula varies in the same extraordinary fashion. *P. Beesiana*, on the other hand, varies little in a natural state, but it is cross-pollinated very readily, with the consequence that if there are any plants of say *P. Bulleyana* or *P. Poissonii* in the neighbourhood, each seed of *P. Beesiana* is suspect. Complete segregation is both tiresome and laborious, and so the only method left of obtaining uncontaminated seed is to grow a Primula of this type in a big batch. In this way wandering bees will leave any foreign pollen on the plants nearest the outside, and so plants towards the centre of the clump will be fertilised with pollen of the same species. If only a small stock is required, it is best to do this by division. Doubtless in time more fixed hybrids will find their way into gardens when selection has been carried far enough, but at present it would be wiser if seedlings, however fine, were named in the same fashion as those which have been produced in Ireland and are called Lissadel hybrids, as this gives the prospective grower an indication that the types are not fixed. A number of fine hybrids have appeared in gardens, some of them named, others nameless, only to disappear in course of time because they do not come true from seed. Among them may be mentioned *P. Edina*, a fine salmon-coloured cross between *P. Beesiana* and *P. Bulleyana*, which was raised at the Royal Botanic Garden at Edinburgh. Among hybrids which have a reputation is *Red Hugh*, perhaps the most vivid of all Primulas, a rich colour that might be called copper-crimson; but the colour varies and some shades are not so good as others.

THE CAPITATA SECTION.

The Capitata section contains one or two of the best of the tight-trussed Primulas of our gardens. This section is closely allied to the Muscarioid. The flowers are borne in a compact group, either round or rather flat in shape, with each individual flower carried on a very short pedicel. They have what is called an apical crown, and the flowers expand in succession from below upwards. Primulas of this section are often confused with those of the Denticulata section, but there is one

PRIMULA BULLEYANA (CANDELABRA SECTION)

In full flower. Sufficient plants fill the area without any suspicion of overcrowding

easy mark of distinction: the flowers in the heads of the Capitata section all point downwards, whereas the flowers in the Denticulata section all point upwards.

Situation.—This section is quite amenable to ordinary garden treatment, as it has no objection to a moderate amount of sun or to moderately dry conditions, which make these species admirable plants for the rock garden. Nor do they object to moister and richer conditions, provided that the drainage is good. This is a *sine qua non* if the plants are to survive the winter, as on the slightest signs of stagnation rotting of the crown at once sets in.

Propagation.—These plants are easy to raise from seed, but this is not always provided in abundance. Several crowns are usually formed in the course of the season, and these should be divided every year; but where the ground is at all inclined to be heavy and waterlogged, a fresh stock of seedlings should be raised every year and the plants treated as biennials. Where, however, the drainage is perfect, they have proved to be absolutely perennial.

Species.—*P. capitata*, introduced in 1850 from the Himalayas by Sir Joseph Hooker. All the other species of the section are more or less forms of this plant. The leaves are not unlike the common Primrose in shape, but are narrower and more crinkly; they are covered above and below with white meal. The tight truss is carried on a stout stem about 6 to 8 inches in height. The colour is a mauvy lilac, rather deep in tone. The true species is not too common in cultivation, and is not so good as the next two.

P. crispata, a microform of *P. capitata*, of which the type specimen was collected in Sikkim by Cooper at 11,000 feet. The flowers are very much the same as those of *P. capitata*, perhaps a little larger and of a deeper blue-lilac, and are faintly powdered with meal; but whereas the leaves of *P. capitata* are snow-white underneath, and more or less white above, the foliage of *P. crispata* shows no signs of meal above or below. The flowers are fragrant. This Primula must not be mistaken for *P. crispa* of the Denticulata section.

P. Mooreana, another microform of *P. capitata*, also found in Sikkim, and by far the best of the group. In both foliage and flowers this plant is larger and finer than the two preceding species. Here again the foliage is different; the upper-surface is a bright green, and the under-surface is coarsely reticulated, so much so as to have the appearance of honeycomb, and this is covered with white meal. These valuable plants have an added advantage in that they are among the latest flowering of all Primulas, and their deep lilac-blue flowers are produced very freely from the end of July, throughout August, and even into September. They are robust, easy to grow, and altogether satisfactory.

These three Primulas are dealt with at some length as their nomenclature is usually sadly at fault. There are signs that they are interbreeding in cultivation, but a sure test is the presence or absence of meal on the foliage.

P. sphærocephala may be called the Chinese *P. capitata*. The names are practically synonymous.

The Cortusoides Section.

As far as the foliage is concerned, this section is one of the most decorative for outside cultivation. The foliage is large, crinkled, heavily veined, more or less lobed, and is carried on a conspicuous stalk. In shape it is usually as broad at the base as it is long, narrowing as it approaches the point. The flowers are carried on a scape varying from 8 inches to 14 inches in height. They are more or less flat-faced, carried on pedicels of varying length; the colour varies from a rose-pink to a purple-lilac. This is another section in which many of the plants now grown in gardens are wrongly named, and so a considerable amount of description of individual species is necessary. Some of the species may verge too much on the magenta to suit many tastes, but the colour, although violent, is rarely muddy, and grown in big groups they are admirable species for the wild garden and woodland. *P. lichiangensis* is a limestone plant.

Situation.—This section consists of species that delight in a fair amount of shade. They will grow equally well in woodland or in the more shaded parts of the rock garden. Moisture is not such a necessity as in many of the Asiatic species, and so long as the soil is not parched during the growing season they are perfectly satisfied. The drainage must be good and the soil fairly light, with a good proportion of humus.

Propagation.—All the species of this section are true perennials, and so fresh stock need not be raised every year. They set a great deal of seed that germinates freely. They also make a number of crowns, which makes propagation by division an easy matter.

Species.—*P. cortusoides*, said to be the third extra-European species to have been introduced into cultivation in 1794. It comes from the Asiatic mainland opposite Northern Japan, and is now very rare in cultivation, most of the plants supplied under that name being *P. saxatilis*. The leaves are large, broad at the base, slightly lobed, and running to a blunt apex. The true species is a tall and graceful plant, with flowers of a clear rose. A good diagnostic mark is that the flowers of *P. cortusoides* are carried on short pedicels, thus making a fairly tight truss, whereas those of *P. saxatilis* have much longer pedicels, giving it a much looser appearance. Another close relative is *P. Kaufmanniana*, a species from Turkestan that used to be in cultivation. In this plant the flowers are like those of *P. cortusoides*, but the leaves are rounder and more deeply lobed.

P. lichiangensis, introduced in 1908 by Forrest from the Lichiang range of Yunnan, where he found it growing on shaded limestone cliffs. This has proved an excellent Primula in cultivation, closely allied to *P. Veitchii*, from which it differs in larger flowers that are rather more drooping and in the absence of white on the under-surface of the leaves. The flowers are large and prominent, with a yellow eye and purple anthers, and are a good rose-magenta in colour. They are carried on a flower stem about 8 inches in height. Half-shade is necessary.

P. saxatilis, a Primula from Northern Asia (see *P. cortusoides*). The conditions of cultivation are the

PRIMULA SAXATILIS (CORTUSOIDES SECTION)

Growing in a bed in the bottom of a rock garden where the soil is fairly rich and moist

same as those for *P. lichiangensis*. This is a useful garden plant, and, like all this series, they are excellent for indoor cultivation in pots or pans.

P. Sieboldii, introduced in 1861 from Japan. Its range is from Central Siberia to Japan. This is probably the best species of the section. It is a Primula that is often confused with *P. cortusoides* and *P. saxatilis*. Its botanical distinguishing mark is the presence of spreading calyx segments, much more conspicuous than those of the other two species. Variable though *P. Sieboldii* is, as a garden plant it can always be recognised by its luxuriant growth—it is the best "doer" in the section—with its soft but rugged leaves and its fine loose heads of flowers, often with fringed petals, carried on bare stems. The best forms are a true rose in colour. As a plant for a cool position in half-shade there are few to equal *P. Sieboldii*; it is robust without being coarse, and rampant without becoming a weed. It comes with great ease from seed, but if you possess a particularly good form propagation should be done by division.

P. Veitchii, introduced by Wilson from Szechuan. The leaves are stalked, large, and heavily lobed, green on the upper surface and pure white below. The lowers, not quite so large as those of *P. lichiangensis*, are carried on stems that are more or less prominently hairy. They are often borne in tiers, like those of the Candelabras. In colour they are a pure magenta—not a bad shade when they are planted in bold clumps—with an orange eye and yellow anthers, another mark o distinguish it from *P. lichiangensis*. With its ease f cultivation and its handsome foliage, soft as velvet in the young state, this Primula is already popular, and it might be more so if only gardeners would grow it in the mass and not as a single plant among a collection of Primulas. It likes the same conditions as *P. Sieboldii*, half-shade and a cool and moderately light soil, but it will do with a trifle more moisture during the growing season, if its foliage is to make its best growth. It is easily raised from seed or by division.

The Cuneifolia Section.

In cultivation this section is practically limited to one species, *P. suffrutescens*, a plant from the Central Rockies of the U.S.A. This is one of the sub-shrubby species making long woody branches, from the tips of which the foliage appears. Although sub-shrubby it is prostrate in habit. The leaves are narrow, widening at the apex, dark green and glossy. The flowers are carried on a thin, wiry stem about 8 inches in height. They are usually three or four in number on fairly long pedicels, with a corolla tube of a length equal to the diameter of the flower. The colour is a bright pink with an orange eye. It is strange that this Primula is not more popular; perhaps it is because gardeners imagine that all Primulas like the same treatment. This one does not. It thrives in a warm and sheltered position in the garden in almost full sun. The soil should be light and sandy—a mixture of peat and coarse sand suits it to perfection—and the drainage should be perfect. In such a position it will increase rapidly and flower freely; but beware of a stagnant soil during the winter. Like many sub-shrubs it is difficult to propagate except by seeds. It may be layered, but it is impossible to increase it by division. Do not be alarmed if some of the branches die off; they will break usually the following spring from the side. This is a Primula that should be more often seen.

The Denticulata Section.

A very important section in gardens owing to the presence of the old favourite, *P. denticulata.* The leaves are narrow, toothed, and crinkly, and form close rosettes of foliage. The flowers are carried on stout stems, many blooms to a truss, somewhat like those of the Capitata section in shape, but each flower points upwards, which makes the truss looser, rounder, and more regular in shape. Also, almost all the flowers come out at the same time.

Situation.—This section will stand more sun and drier conditions than almost any of the Asiatic Primulas. They are also the easiest to grow. They succeed equally well in the rock garden, thin woodland, or in an ordinary garden border—in fact, in some parts of the country *P. denticulata* is a favourite cottage plant, where it is grown in any and every corner of the garden. The only thing of which to beware is an excess of moisture during the winter. Any soil suits them so long as it is not too light.

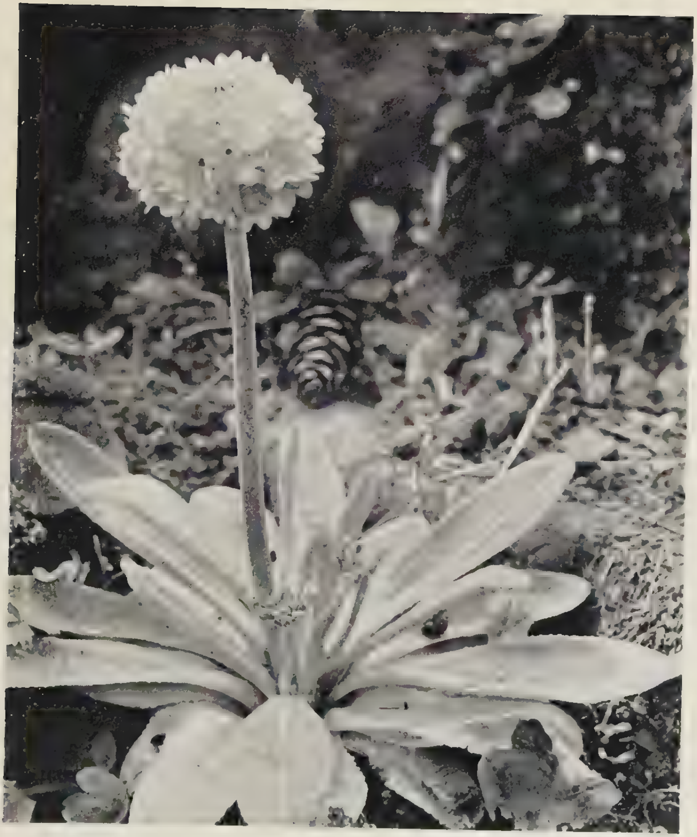
Propagation.—All the Primulas of this section are easily grown from seed, or the crowns may be divided.

Species.—*P. cashmeriana.* The less said about this name the better. It used to be listed as a separate species from *P. denticulata*, but for all intents and purposes the names are synonymous. In the dried specimens of the original plants it may be that *P. cashmeriana* was a rather more genteel-looking plant than *P. denticulata*, but this has disappeared in cultivation.

P. crispa, a Sikkim species. Very rare in cultivation, and not to be confused with *P. crispata* of the Capitata section. The leaves are short, green on both sides, with long red petioles. The flowers are almost a violet, and are covered with yellow meal on the outside of the petals.

P. denticulata, an old introduction from the North-West Himalayas, and, perhaps, the most universally popular Asiatic Primula in our gardens. Now that so many other Asiatic Primulas are coming into general cultivation, it may be that *P. denticulata* may lose some of this popularity, as no one who has grown, say, *P. involucrata*, *P. cernua*, or *P. sikkimensis*, can call *P. denticulata* anything but a rather coarse and cabbage-like plant. Still no one can but help approving of its good temper and free-flowering qualities. It loses some of its coarseness if it is grown in soil that is not too rich, and then it becomes a better plant. There are many forms in cultivation, of which the best is undoubtedly the white, *P. denticulata alba*, a plant of real loveliness. The variety called *rubens* is not nearly so good, as the colour is a dirty reddish-purple.

P. erythrocarpa, a Bhutan plant, introduced by Kingdon Ward. This is much more aristocratic looking than *P. denticulata*, and, although still rare in cultivation, it will become popular. The leaves are smoother, bright green above and paler below, with signs of meal. It is a larger plant than *P. denticulata*, but



PRIMULA ERYTHROCARPA (DENTICULATA SECTION)

A new species. It is a perfectly hardy and robust plant.

it is not so squat or coarse. The flower stem is about 10 inches in height, and the flowers are much paler, nearer a real mauve, with a yellow eye. They are fragrant. This plant likes a rather moister situation and half-shade. It is certainly a plant with a future. Propagation from seed.

P. limnoica, another species rare in cultivation. Introduced by Farrer from Upper Burma at 9,000 feet. The leaves are smaller than others of the section in cultivation, and the plant is devoid of meal except in the flower head; otherwise it is very like a more refined *P. denticulata*. It has no objection to comparatively dry conditions. It is easily propagated by division, as it makes any number of crowns.

THE MOLLIS SECTION.

It is doubtful if *P. mollis*, the type member of the section and a plant from the Himalayas, is still in cultivation. It proved to be not sufficiently hardy for cultivation outside, unless, perhaps, in the mild west. There is another species that is proving more hardy if given a moist situation in deep shade. This is *P. seclusa*, from 9,000 feet in Upper Burma; but it is doubtful if this plant will ever become popular, as it is a coarse grower, with large, rather flabby leaves, and flowers that are small in comparison to the leaves, of a bright rose-purple, almost a magenta. Its main use is in dark and damp positions that have not sufficient light for growing other Primulas. It should be grown from seed, as the fleshy roots and stem have a habit of rotting when the plant is divided.

The Geranioides Section.

The name describes the appearance of the foliage of the species included in this section. The foliage is petiolate, and lobed like a Geranium. The flowers are almost always drooping, in shape campanulate or cup-shaped, and the colour is a reddy-purple or magenta.

Situation.—They are all shade-loving plants. In their native haunts they live in a rich soil in woodland where they get comparatively little sun. This is a situation which we should try to copy. Although the soil should be on the heavy side, yet the drainage must be good. They are liable to winter rotting, and so seed should be saved each year. While the colour verges on the magenta, yet they are handsome little plants, not unlike those of the Cortusoides section, but on a smaller scale.

Propagation.—Although quite hardy, they are not so robust as the Cortusoides section, and division is not always possible. They grow freely from seed, but seedlings should not be allowed quite so much light as most other species.

Species.—*P. geraniifolia*; not common in cultivation. A plant from Sikkim and the Chumbi Valley in the Himalayas. The leaves are typical of the section, heavily veined and lobed. The flowers have short pedicels, and are borne on a thin and wiry stalk. They are campanulate in shape, with a narrow tube, and are a good rose in colour. For real shade there are few more charming Primulas, and it should be more often grown.

P. heucherifolia, sometimes listed as *P. Gagnepainii*.

Introduced by Forrest in 1906. The leaves are as soft and as cut as those of *P. geraniifolia.* The flowers are pendent, with a wide corolla tube, and are of a deep purple; they are carried on 6-inch stems. This plant is smaller than *P. geraniifolia,* but just as, if not more, graceful. It has a particular objection to winter damp, and so the soil must be fairly porous.

P. septemloba, a larger plant than the last, with a longer and narrower corolla tube. In appearance it is very like *Cortusa Matthioli.* The flowers are a deep magenta. Although of an easier temper, it is not so charming as either of the two previous species.

THE FARINOSÆ SECTION.

P. farinosa itself, the Bird's Eye Primrose, and one of our own native Primulas, is the most widespread of all Primulas, and is dealt with in the chapter on European Primulas. There is one other species, a very distinct plant, that so far is rare in cultivation, but will become popular once its beauty is better known. This is *P. caldaria,* found by Forrest in Yunnan at 8,000 to 9,000 feet. The variation in height of this species is remarkable; it varies from 6 inches to 20 inches. The foliage is similar to that of *P. farinosa,* with the under-surface of the leaves covered with white meal. It is very floriferous, and carries a large head of white, fragrant flowers. Forrest found it in the neighbourhood of hot springs, but it is proving quite amenable to cultivation in a fairly rich, cool soil, with a moderate amount of moisture in half-shade. It is best increased by means of seed.

THE MUSCARIOIDES SECTION.

A most important section. The leaves are either entire or finely toothed, and grow in distinct rosettes. The flowers are carried in close heads or spikes, pedicels being almost entirely absent. The flower scapes are long and slender.

SITUATION.—The difficulty in growing Muscarioids would cease if growers would only consider them as true biennials. They are quite hardy, and will survive any kind of winter until they have flowered. Then winter wet seems to affect them at once, and few, if any, survive wherever they may be planted. They like a rich porous soil with plenty of moisture during the growing season, and as little as possible during the winter. They also prefer half-shade. This makes the larger species better plants for the stream-side, the wild garden, or a shady border, than for the average rock garden, where conditions are usually too dry.

PROPAGATION.—Seed should be saved every year. This is not always set with great freedom, but there is almost always sufficient for a fresh stock. What there is germinates well, and is easily raised. In some cases two or more crowns are made the second year before flowering. Such crowns as do not flower may be divided from the flowering crown and replanted.

SPECIES.—*P. cernua*, a distinct species from north of the Tali lake in Yunnan. The leaves are entire and spathulate, a good distinguishing mark. The heads of flowers are more in the shape of a tight truss than in a spike. The flower heads are large and the colour is a deep clear blue with a hint of purple in it. This fine Primula requires the same cultivation and propagation every year as all the Muscarioids.

P. conica, rare in cultivation. Introduced by Forrest, from 11,000 feet in Yunnan, in 1914. This is a plant that is closely allied to two other species—*P. muscarioides* itself and *P. Giraldiana.* Except in minor points they are very much alike in cultivation, so much so that the average gardener may be satisfied if he has one species. The main differences are as follows:

P. conica has hairy scapes, absent in the other two, and slightly larger individual flowers.

P. Giraldiana has calyx teeth that are acute; in the others they are obtuse.

P. muscarioides—the whole plant is practically glabrous; both the other species have hairy leaves, and *P. conica* a hairy scape.

These three Primulas are neat little plants with heads of flowers that are nearly a spike in shape. The colour is a deep blue with a hint of purple in it, with the exception of *P. muscarioides,* which is paler in tone. Like all other species in this series, they must be treated as biennials.

P. Giraldiana, a plant from Northern Shensi (see *P. conica*).

P. Littoniana, the best known and most popular of the section. The downy oval leaves are carried in an upstanding tuft, very different from the rosette type of the rest of the series. From this rises a powdered scape, on the top of which is a flower spike, when young like a tiny Tritoma, from the scarlet bracts with which it is clothed. From the bottom upwards unfold numerous tightly packed flowers of a deep violet. The total height of the ordinary form may reach 14 inches, but there is a larger form, called botanically var. *robusta*, and in gardens Giant Form, which reaches 2 feet, but which is not quite so good in colour, being a lavender-lilac, and sometimes rather washy at that.

This magnificent Primula is too grenadier-like for the rock garden, but it is eminently suited for bays by the streamside where the drainage is good, and it can get plenty of moisture during the summer months. It may be grown in a shaded border where the soil is rich, without being too heavy, but the waterside is really the ideal situation. It must be raised from seed every year, and in order to make certain of seed the flowers should be hand pollinated.

P. Menziesiana, introduced by Cooper from Bhutan. This is one of the most charming of the series. It is a small plant with soft, hairy, oval leaves. The flower spike is not nearly so deep as many others of the section, and the flowers are set more horizontally. The colour is a rich blue. This is the most sensitive of the section in cultivation. The soil should not be too heavy, and the drainage must be perfect. It must be treated as a biennial.

P. muscarioides, a species from the far north of Yunnan (see *P. conica*).

P. pinnatifida, collected by Forrest in Yunnan. The leaves are very toothed and hairy, much more rugged than in others of the series. The flower stem is wiry and covered with meal. The flowers are fewer in number in the head, but with the same insignificant pedicels. The colour is a fine blue. This is one of the most charming of the series, and the most difficult to grow, as it has a horror of winter wet. It should be grown in a very porous soil—a mixture of peat, sand, and leaf-mould, in the proportion of two, two, and one. The crown should be protected with small chips of stone, or even with a pane of glass during the winter. It is worth a good deal of trouble. It must, of course, be treated as a biennial.

THE NIVALIS SECTION.

There is no doubt that this section contains many of the most magnificent of all Primulas, but—and this is a big BUT—most of them are the most tantalising and exasperating of all in cultivation. Why this should be no one knows. In their homes they grow along with, or near, other accommodating species that succeed admirably in gardens. Then, again, they are not hairy plants which you would suspect of winter rotting. Perhaps it is their very fatness in their native haunts that makes them refuse to take kindly to us. There are a few, however, that are splendid plants, although not the best, unfortunately, which are comparatively easy to grow.

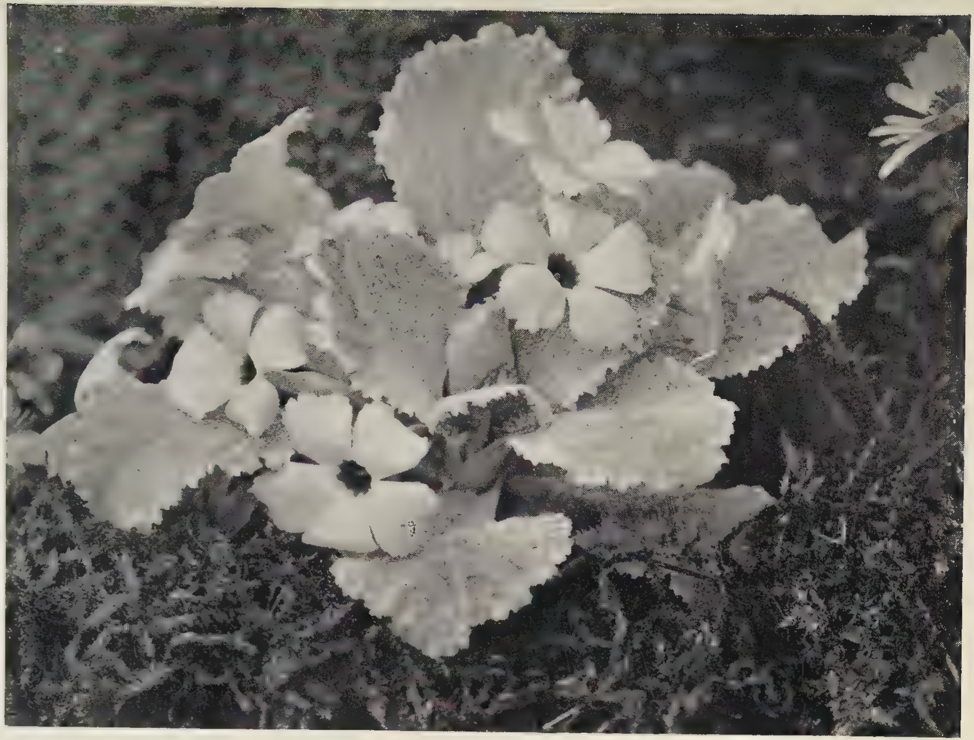
The leaves are rather thick, fleshy, and riband-shaped, of approximately the same width throughout. They are more or less covered with meal. As a rule, the leaves continue expanding after flowers are past. The flower trusses are always large and rather loose. The seed capsule is large and cylindrical, and the seeds are like tiny angular chips of wood.

SITUATION.—Above all Primulas these like a rich soil. The late Sir Isaac Bailey Balfour used to say that the best situation for them was in a rose-bed where the heavily manured soil suited them. Wherever they may be planted the soil should be enriched. They like a moderate amount of shade, but sun has little effect on them so long as their feet are in a soil that suits them. Moisture during the growing season is as necessary as its absence in quantity during the resting period. A bay in half-shade at the foot of a rock garden, or the bank of a stream where there is sufficient drainage, is a good situation.

PROPAGATION.—As a rule, Primulas of this section do not form many crowns, and so they have to be increased by means of seed, which is produced freely. Where they are happily situated, these Primulas may survive for several seasons, but a fresh stock should be raised every year.

SPECIES.—*P. chionantha*, introduced by Forrest from Northern Yunnan at 12,000 to 13,000 feet. A magnificent plant, and quite easily grown. The leaves are long and strap-shaped, and are covered together with the stem and calyx with golden meal. The flower stems are stout—12 inches or more in height. The flower head is loose and large, as are the individual flowers, which in good seasons may be as much as an inch in diameter. The colour is ivory white. The flowers are very fragrant. This species is quite hardy, but the size of the flowers and leaves depends largely on the season. It will grow under typical invalid conditions.

P. melanops, introduced by Kingdon Ward from



PRIMULA WINTERI (PETIOLARIS SECTION)

In full flower in March. It is growing in a northern exposure and is protected from excess moisture by an overhanging rock.

South-West Szechuan, from 18,000 feet. Another fine species which is proving quite amenable to garden cultivation, although still somewhat rare. The leaves are typical of the series, but rather smaller than those of *P. chionantha.* They are covered below with a white meal. The flowers are carried in a loose whorl, sometimes with a secondary whorl. They are deep blue-purple in colour with a black eye, which make it a very striking plant. The height of the flower stem is about 8 inches. This species will succeed under the same conditions as *P. chionantha.* This Primula flowers early, and in some seasons flowers again towards autumn.

P. sinoplantaginea, found by Forrest on the Salween, in Western Yunnan. This plant is the most satisfactory and hardy in cultivation. The leaves are narrow and covered below with a meal that is almost white, as is the flower scape. The colour is a deep blue-purple. In some gardens, where the drainage is sufficient, this plant has survived for several years without the stock having to be replenished. It is well worth growing, and doubtless will become popular when better known.

P. sinopurpurea, introduced by Forrest from North-West Yunnan. The leaves are broader than are those of *P. sinoplantaginea*, and are covered below with yellow meal. The flowers also are slightly larger. The flowers are rather paler in colour, but a good purple-blue with a whitish eye. This is the most tricky member of the section that can be called at all common. A fresh stock should be raised every year. It likes conditions similar to the rest of the section.

THE PETIOLARIS SECTION.

It is sad to relate that, with the exception of one species, *P. Winteri*, Primulas of this section have refused most obstinately to respond to cultivation. They include some of the finest of the genus. It is not only that they will not grow, but that the seeds will not germinate. The reason is that these Primulas have a flat seed capsule that is covered with a thin transparent membrane. This splits early in the season, and the seed is shed green. This peculiarity means that the seed will not keep. The one species that is in cultivation has a bad name for miffiness amongst gardeners, which is entirely unjustified. This Himalayan Primula is very lovely. The leaves are large and crinkled and toothed at the edges. They are covered with a white meal. The flower scape is short and thick, and on the top emerge large lavender flowers with fringed lobes set in a firm head. This glorious plant is one of the first to flower in February, or even earlier, and therein, perhaps, lies the supposed miffiness. The truth is that *P. Winteri* is absolutely hardy, so long as moisture does not settle in the winter on the cabbage-shaped bud that forms at the end of the past season. It likes a situation in an almost perpendicular cleft in the rocks in rather more than half-shade, or even facing north, where its roots can get deep into a rich, cool, moist soil behind, or where moisture can be kept off by an overhanging rock. There, if it is covered with a pane of glass during a wet autumn and winter, it will flourish and flower year after year. It usually forms several crowns, and so may easily be divided, and seed germinates freely. If only a little care is taken, gardeners would lose their distrust of this Primula.

THE SIKKIMENSIS SECTION.

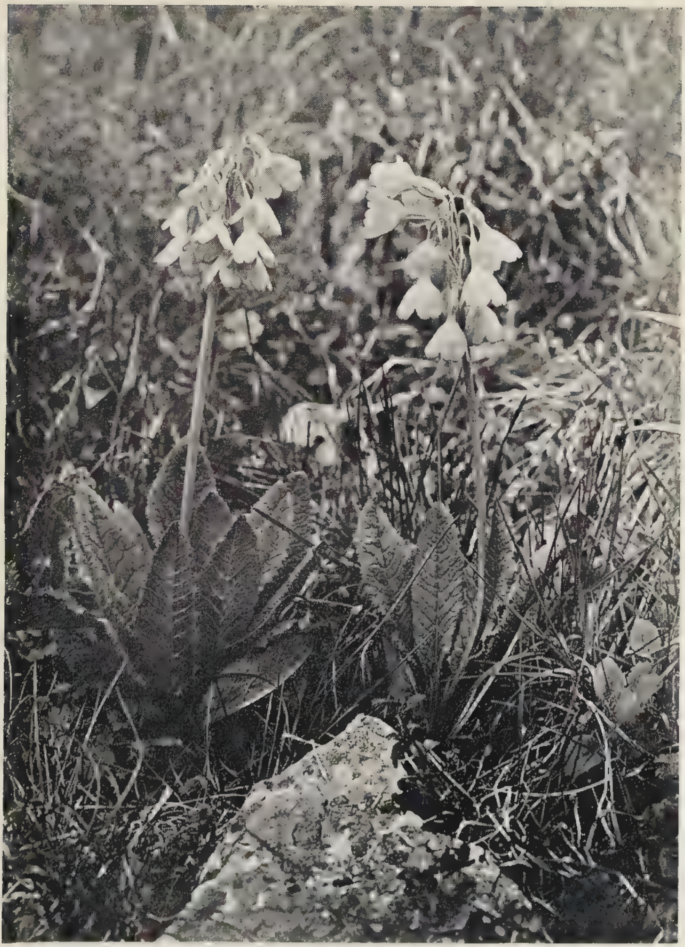
After the Candelabra Primulas the Sikkimensis section is the most important in gardens. They all have clusters of long, toothed leaves and scapes bearing an umbel of graceful drooping flowers, usually on fairly long pedicels. The fruit is narrow and cylindrical, and projects beyond the calyx.

SITUATION.—All the species that are in cultivation of the Sikkimensis section are quite hardy. In their native habitat they live under much the same conditions as Candelabra Primulas, although some of them prefer the edges of clearings where they get rather more shade and shelter. They should always be grown in half-shade, except possibly in the moister west. In many parts of the country they can be counted as strictly perennial, but this is a case where individual experience will prove whether it is better to grow them as biennials or not. To begin with, seed should be saved and a fresh stock grown every year until the plants are thoroughly tested. The soil should be fairly rich, but it need not be so heavy as in the case of Candelabras. The drainage must be good, as the Sikkimensis are just as liable to winter rotting.

PROPAGATION.—Primulas of this section are good seed-bearers, but so far they do not seem to seed themselves with any freedom. As far as is known they do not cross readily with other species. Where multiple crowns are formed, they may be readily increased by division during the last half of July and August.

SPECIES.—*P. flexilipes*, found by Forrest in South-East Tibet. This is a very graceful sikkimensoid Primula. It is not so tall as *P. sikkimensis*, usually growing about a foot in height. The flowers are rather paler in colour than those of ordinary *P. sikkimensis*, being of a luminous creamy yellow, more or less covered inside and out with a pale meal. They also droop more than those of the latter, and the pedicels are shorter. It may be likened to a more delicate and paler flowered *P. sikkimensis*, and, although rare in cultivation, it should be more grown. It is particularly addicted to winter rot, and so seed should always be saved.

P. Florindæ, found by Kingdon Ward in South-East Tibet at 12,000 feet. This is the giant among Sikkimensis Primulas. Although only found in 1924, it is already becoming well known in gardens, and will undoubtedly become a very popular garden plant. The leaves are stalked and are larger and more heart-shaped than most of the section, and are very distinct from all others as they are extremely cordate—a real distinguishing mark. The flower scape will reach a height of 3 feet or even more. The flowers are very numerous, from twenty to forty in a truss, and are carried on long pedicels. They are a bright sulphur-yellow, coated with meal, and smell strongly of the common Cowslip. This magnificent Primula is growing remarkably well in cultivation, but it is essential, if it is to succeed, that it be grown in moist ground. It cannot have too much water in the growing season so long as it is not stagnant. For sheer magnificence a group of healthy *P. Florindæ* can hardly be beaten, but it should only be



Photo, George Forrest.

PRIMULA PSEUDOSIKKIMENSIS (SIKKIMENSIS SECTION)

As it grows in alpine meadows in Yunnan

grown along with other robust Primulas, otherwise it will dwarf all its neighbours. There is another form with smaller leaves of the same distinct shape, and which shows a difference in time of flowering of some six weeks.

P. microdonta: It is doubtful if the type is in cultivation, but Kingdon Ward introduced a form of it from South-East Tibet called *P. microdonta* var. *alpicola*, from a slightly higher altitude. In cultivation this fine plant almost reaches the size of *P. Florindæ*, but the flowers are a paler yellow, and the leaves separate it at once from *P. Florindæ*, as they are not cordate in the slightest degree. This Primula never has the appearance of coarseness that sometimes afflicts *P. Florindæ*, which looks as if a little starvation would improve its bulk. As *P. microdonta* var. *alpicola* comes from higher alpine pastures, it is proving in cultivation to succeed under more ordinary garden conditions. Whereas *P. Florindæ* is the better for being grown near water, there is no reason why the former should not succeed admirably in the shadier and cooler portions of the rock garden. Excessive moisture is not essential. In many parts of the country these two Primulas are proving absolutely perennial.

There is a plum-coloured form of *P. microdonta* var. *alpicola* which is even more lovely. The outside of the corolla is plum-coloured, while the inside is cream with plum showing through owing to the dense coating of meal. As far as is known this plum form comes true from seed. There is also a creamy-white form, called Moonlight. Both forms are very fragrant. This Primula occasionally sends up flower scapes with two or more tiers of blossom.

P. pseudosikkimensis, found by Forrest in the Lichiang range in Yunnan. This is so like the ordinary *P. sikkimensis* that for all intents and purposes it is the same plant. It is, perhaps, a trifle smaller, and it seems that it is much more beloved by slugs. Gardeners will note, however, that it is a limestone plant. Primulas of this section are, as a rule, not very happy growing in soils that have soluble lime, and where lime is found to be present, this Primula should certainly be grown.

P. secundiflora, introduced by Forrest from Yunnan. A very charming Primula. The leaves are much more glossy than most of the section. The plant is not coarse, and rarely reaches more than 15 to 18 inches in height. The colour of the flowers is plum-purple—very striking, rising as they do from calyces striped with white meal. They droop more than do those of *P. sikkimensis*. This Primula is very similar to another species in cultivation called *P. vittata*; one of the distinguishing marks is supposed to be that the leaves of *P. secundiflora* keep in a fairly flat rosette, while those of *P. vittata* stand more erect. Both species prefer a fairly rich soil and abundance of moisture. They are, therefore, not strictly plants for the rock garden.

P. sikkimensis, a very old introduction from the Himalayas, and so well known that description should be unnecessary. The fragrant, soft yellow flowers and the grace of habit make it one of the most popular Primulas in cultivation; in fact, it is very doubtful if it is beaten by the newer introductions, such as *P. Florindæ*. As a rule, this Primula is not seen at its best, for the sole reason that it is grown in an unsuitable position in the garden, where it is often scorched by the sun, and does not receive enough water. This point is more fully dealt with in the chapter on cultivation, and it applies to this section of Primulas generally.

P. vittata, introduced by Wilson from the Chinese-Tibetan border (see *P. secundiflora*).

P. Waltoni, introduced by Kingdon Ward from South-East Tibet. This Primula has not settled down in cultivation like some of his other introductions of the same year, such as *P. Florindæ*. It may be that a home-bred generation will prove more amenable to garden treatment, but up to the present it must be classed among the more difficult Primulas. This is a pity, as the flowers are of a wonderful glossy, port-wine colour, thickly covered inside with white meal. It transplants badly in the seedling stage, and so the seed should be sown very thinly, and the seedlings be grown on in the original pot. As far as can be judged, it succeeds best in similar positions to *P. Florindæ*. It cannot be called a robust plant.

The Soldanelloides Section.

The Primulas of this section are not unlike the Muscarioids, but in this case the individual flower is much larger and cup-shaped. There are also fewer flowers to the flower head. There are only two species in cultivation, one of which, *P. nutans*, has a poor reputation, which is unjustified, and the other, *P. Reidii*, requires indoor treatment.

P. nutans, introduced by Forrest from Yunnan. The leaves are long and oval, covered with fine short hairs. The scape is mealy. The flowers are carried in a short spike after the fashion of the Muscarioids, but the corolla limb is much widened and the flowers are cup-shaped. The colour is a lovely lavender-blue. This Primula is not nearly so soft as many gardeners make out, but, like so many Chinese Primulas, it hates an excess of moisture during the winter. It should be grown in half-shade, in a soil that is rather peaty and not too heavy. The drainage must be perfect. This is one of the most lovely and charming of all the genus, and every effort should be made to grow it. It should be treated strictly as a biennial, and grown from seed every year.

P. Reidii (see chapter on Primulas under Glass), creamy-white in flower, and very mealy throughout; flowers similar in shape to those of *P. nutans*, but far fewer carried to the truss—usually only three or four.

THE SUFFRUTICOSA SECTION.

This is a section of sub-shrubby Primulas. They form thick stems, often an inch in diameter, on which are perched the clusters of evergreen petiolate and rather rough-surfaced leaves. Their density is increased by the fact that the old leaves hang for a long time. The flowers are usually carried in rounded umbels, and in shape are not unlike the common Primrose.

SITUATION.—Here we come upon a distinct change from the usual run of Chinese Primulas, as the Suffruticosa section hate moisture. There are two situations for them—one in a perpendicular crevice between rocks or in an old wall, the other under an overhanging rock. It makes no difference if the part of the plant above ground gets no moisture at all; the roots will work their way down to reach sufficient moisture for the plant. They like a certain amount of sunshine.

PROPAGATION.—In the Midlands and on the East Coast these Primulas are proving hardy and absolutely perennial, but in the moister West they require renewing every two or three years. They are raised easily from seed, but it is safer if the flowers are hand-pollinated. They cannot be divided.

SPECIES.—*P. Forrestii*, introduced by Forrest from Yunnan. The plant is typical of the series. The colour of the flowers is a good butter-yellow, and they are fragrant. There is another close relative that has been named *P. rufa*, and they are so closely akin that in the garden they may be taken as the same plant. It is said that *P. rufa* is hardier, but there is little to choose between them. There is a plant under an overhanging rock in a Perthshire garden which has now been in the same position for four years. The leaves are now perched on the top of a woody stock about 10 inches in height.

P. redolens, introduced by Kingdon Ward from Yunnan. This Primula is still rare in cultivation. It is very like *P. Forrestii*, but the colour is white, flushed with pink, or more occasionally a pale violet. It is very fragrant. For treatment, see *P. Forrestii*. It is said to be even hardier than the latter, and a more robust plant.

P. rufa (see *P. Forrestii*). The difference between them, if any, is the presence of more hairs of a rusty-brown on the leaves of *P. rufa*.

THE VERNALES SECTION.

This is the section to which our common Primrose belongs. The Asiatic species of this section in cultivation is confined to one, *P. Juliæ*, and its numerous forms and hybrids. This floriferous, low-growing Primrose, with red-purple flowers and a golden eye, is so well known as to require no description. It luxuriates in a cool and rich soil, and may be grown in any part of the garden where those conditions exist. It flowers early in the year, and continues almost to summer. There are innumerable forms and varieties, some of them improvements on the type, many of them not. Those with large flowers are so opulently floriferous that they have lost a deal of the grace and charm of the original plant. They look artificial. Among the best of the hybrids are *Juliana gloria*, deep claret, with a golden eye, very large flowers; and *Wanda*, very free-flowering, more red in the tone. If it is desired to propagate a particular form, this must be done by means of division.

THE GENUS OMPHALOGRAMMA.

After a number of vicissitudes, these curious plants, that somewhat resemble enormous violets rising from Primula leaves, have come to rest in a separate genus closely allied to Primula. There is little doubt that in time these striking plants may become better known once their requirements are more understood. Perhaps the wish is father to the thought. The leaves vary in shape and quality, but could never be mistaken for anything other than a relative of the Primula. The flowers are always solitary, with a long corolla tube, and usually large flattened lobes at the end. Their treatment should be something like that of the Nivalid Primulas, except that they have the very strongest objection to sun. A sheltered position facing north, with good drainage and a rich soil, is the most suitable. They like plenty of moisture during the growing season. A shaded rose-bed would suit them excellently, were such a thing known. They have flowered in some localities for several seasons, and they are proving fairly perennial; and this is a blessing, as the most difficult time for them in cultivation is during their juvenile state. They are propagated entirely from seed. They are much beloved by slugs.

SPECIES.—*Omphalogramma Farreri*, introduced from 11,000 feet in Upper Burma. The hairy oval leaves are long stalked. The large solitary flowers are carried on a hairy 5-inch stem. The corolla tube is long, deep blue-purple, ribbed with a darker shade. The petals are heavily fringed. The colour is a rich blue-purple. This is a plant that grows in rich soil at the edge of Bamboo thickets, and so must have shade from the sun and perfect drainage, with any amount of moisture during the growing season. The soil should be rich.

O. Rockii, a new introduction from Yunnan that appears to be fairly satisfactory in cultivation, although still very rare. This species approaches *O. vinciflorum* (see below), but the lobes of the corolla are even more striking. The colour is deep blue-purple.

O. vinciflorum, a species from North-West Yunnan, and the earliest to be introduced. The hairy leaves are longer and shorter stalked than those of *O. Farreri.* The corolla tube is long, and the petals are entirely separate and not frilled. The two upper petals are slightly reflexed, giving the flower the appearance of a violet. The colour is a deep blue with a touch of purple. This is certainly the easiest of the section to grow, provided that it is treated as described in the first paragraph.

TIMES OF FLOWERING

LOCAL conditions vary so much in the British Isles that it is impossible to give exact dates within which hardy Primulas are in flower. Through the kindness of Mr. R. L. Harrow, the Curator, we give the average flowering time of Primulas at the Royal Botanic Garden at Edinburgh, and Mr. C. T. Musgrave has been good enough to note where the dates differ from those in his garden at Godalming. This should assist gardeners in fixing the average.

PRIMULA.	FLOWERING PERIOD—	
	At Edinburgh.	*Near London.*
Allionii	April	January to April
anisodora ...	June to July	—
auricula	April	—
Beesiana	June	—
Bulleyana ...	June to July	June
burmanica ...	June to July	June
caldaria	June	—
capitata	September to October	July to August
carniolica ...	May	—
cernua	June	—
chionantha ...	June to July	May, and often again in autumn
chrysopa	June	May
Clusiana	April	—
Cockburniana ...	June to July	Mid-May to mid-June
conica	May to June	May
conspersa ...	May to June	—
cortusoides ...	May	—
cottia	May	—
crispa	March to April	—

Primula.	Flowering Period—	
	At Edinburgh.	*Near London.*
crispata	August	—
denticulata	April	After mid-February in mild season for six weeks
deorum	June	—
erythrocarpa	April to May	—
farinosa	June	April to May
flexilipes	June	May
Florindæ	July to August	June to August with some later blooms
Forrestii	March to April	—
frondosa	June	April to May
geraniifolia	June to July	—
Giraldiana	May to June	—
glaucescens	May	—
glutinosa	May	—
glycyosma	July	May to July
helodoxa	June to July	Late May to July
heucherifolia	April to May	—
hirsuta	April	—
integrifolia	May	—
involucrata	May	—
japonica	May to June	April to May
Kitaibeliana	May	—
leucophylla	April	—
lichiangensis	May to June	—
limnioca	March to April	—
Littoniana	July to September	July to August
longiflora	May to June	April to May
luteola	June	—
marginata	April	March to April
melanops	May to June	—
Menziesiana	May to June	—
microdonta	July to August	June to mid-July
minima	July	Mid-early June
Mooreana	September to October	July to August
muscarioides	May to June	—
nivalis (of gardens)	May	April
nutans	July	Mid-June to August
œnensis	May	—

PRIMULA.	FLOWERING PERIOD—	
	At Edinburgh.	*Near London.*
Palinuri	May	April to May
pedemontana ...	May	—
pinnatifida ...	May to June	—
Poissonii	July	May
pseudosikkimensis	July	—
pubescens ...	April to May	—
pulverulenta ...	June	May to June
redolens	March	—
rosea	March	February to April
rufa	March to April	—
saxatilis	May to June	—
seclusa	June to July	June
secundiflora ...	June to July	May to mid-June
septemloba ...	July	—
serratifolia ...	July	—
sibirica	June	May to June
Sieboldii	May to June	April to May
sikkimensis ...	June to July	May to June
sinoplantaginea ...	May	—
sinopurpurea ...	May	—
Smithiana ...	June to July	Late May to July
sphærocephala ...	June to August	June
suffrutescens ...	June to July	April to May
tibetica	May	June
tyrolensis ...	May	May to June
venusta	April to May	—
villosa	April	—
vittata	June to July	—
Waltoni	June to July	End May to end June
Wardii	May to June	—
Winteri	January to March	—
Wulfeniana ...	April to May	April

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